80-141

No.

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In the

Supreme Court of the United States

OCTOBER TERM, 1979

Kelley Manufacturing Company,

Petitioner,

vs.

Lilliston Corporation,

Respondent.

On Writ of Certeriori to the United States Court of Appeals for the Fourth Circuit.

PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

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The Scheffer Press. Inc.—(312) 263-6850

QUESTIONS PRESENTED

1. Whether the decision below is contrary to the federal patent policy of *Lear* v. *Adkins,* 395 U.S. 653 (1969), militating against invalid patents and their anti-competitive effects, in that the Court below failed to afford to the public the intervening rights guaranteed by statute (35 U.S.C. §252) against a reissue patent, reissued because its original patent was invalid.

2. Whether the absolute intervening right guaranteed to the public by the first sentence of the second paragraph of 35 U.S.C. §252 will be upheld where the original patent was invalid as barred under 35 U.S.C. §102(b), regardless of whether the crucial claims of the reissued patent were in the original patent.

3. Whether the Court of Appeals neglected its judicial function in summarily affirming the trial Court's misapplication of the obviousness test of *Graham* v. *John Deere & Co.,* 383 U.S. 1, 17 (1966), in holding non-obvious a patent to a farm implement, where the claimed combination of old elements is plainly taught in a simple combination of prior art patents. *Great A & P Tea Co.* v. *Supermarket Corp.,* 340 U.S. 147, 152 (1950); *Sakraida* v. *Ag Pro, Inc.,* 425 U.S. 273, 282 (1976).

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IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1979

No.

Kelley Manufacturing Company,

Petitioner,

vs.

Lilliston Corporation,

Respondent.

On Writ of Certeriori to the United States Court of Appeals for the Fourth Circuit.

PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

Petitioner respectfully prays that a writ of certiorari issue to review the judgment and opinion of the United States Court of Appeals for the Fourth Circuit in this case.

OPINIONS BELOW

The opinion of the District Court was reported unofficially at 200 U.S.P.Q. 670 (E.D.N.C. 1978). The opinion of the Fourth Circuit Court of Appeals was designated* for non-publication. Both opinions are reproduced in the Appendix, *infra* at A1 and A33, respectively.

JURISDICTION

The Appeals Court entered judgment on February 28, 1980. A timely petition for rehearing, filed March 13, 1980, was denied by order of April 28, 1980.

This Court has jurisdiction under 28 U.S.C. §1254(1).

THE STATUTES INVOLVED[1]

1. Non-obviousness and Validity.

35 U.S.C. §103:

"§103. *Conditions for patentability; non-obvious subject matter*

A patent may not be obtained . . . if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

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* However, this opinion was cited and quoted from at 479 BNA PTC) A-4 (May 15, 1980), and Petitioner has moved for publication of the opinion.

[1] Complete texts of the following and of additional authorities cited in this Petition, Constitution Art. I §8; 35 U.S.C. §§102 (b), 120, and 254; and 37 C.F.R. §1.175 (a) (4), are set forth at App. A37.

2. Reissue Application.

35 U.S.C. §§251 and 252:

"§251. *Reissue of defective patents*

Whenever any patent is, through error without any deceptive intention, deemed wholly or partly inoperative or invalid, . . . the Commissioner shall, on the surrender of such patent . . ., reissue the patent for the invention disclosed in the original patent, and in accordance with a new and amended application, for the unexpired part of the term of the original patent."

"§252. *Effect of reissue*

* * *

No reissued patent shall abridge or affect the right of any person or his successors in business who made, purchased or used prior to the grant of a reissue anything patented by the reissued patent, to continue the use of, or to sell to others to be used or sold, the specific thing so made, purchased or used, unless the making, using or selling of such thing infringes a valid claim of the reissued patent which was in the original patent. . . ."

STATEMENT OF THE CASE

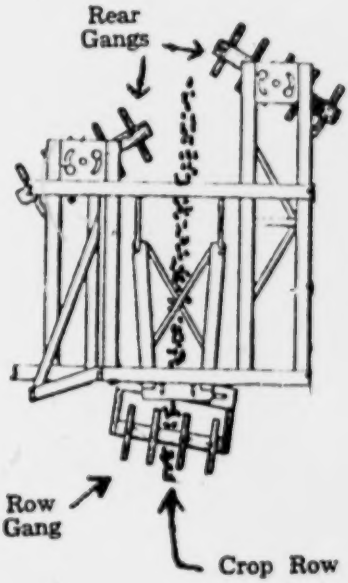
The Suit and Issues Below

Petitioner Kelley Manufacturing Company (Kelley) filed a declaratory judgment action in the trial Court on September 19, 1972, seeking *inter alia* declarations of invalidity and non-infringement of United States Patent No. 2,994,387 (the '387 patent), issued to Lehman *et al* and assigned to the Respondent, Lilliston Corporation (Lilliston). Jurisdiction was founded on 28 U.S.C. §2201. Lilliston counterclaimed for patent infringement.

The '387 patent was succeeded by Reissue Patent No. 28,271 (the '271 Reissue Patent), on December 10, 1974. An amended complaint was filed, raising also intervening rights issues. The '271 Reissue Patent expired on July 31, 1978.

The Subject Matter of the Patent In Suit

The '271 Reissue Patent (Supplemental App. SA 1) relates to a farm implement. The implement claimed includes a cultivator comprising a pair of rear gangs of rotary hoes[2] which cultivate soil on either side of a crop row. Combined with the rear gangs is a single front gang of rotary hoes which rides atop the crop row. It is the triangular configuration of the front "row gang" and the "pair of rear gangs" which were claimed to be patentably novel and non-obvious (S. App. SA 18-19 (Claim 20), App. A8).



Kelley has made and sold a similar, but not identical, cultivator since September 1971. No review of the infringement issue is sought here.

The Prior Art

The patent art on farm machines is crowded and highly developed, as was recognized in both Courts below (App.

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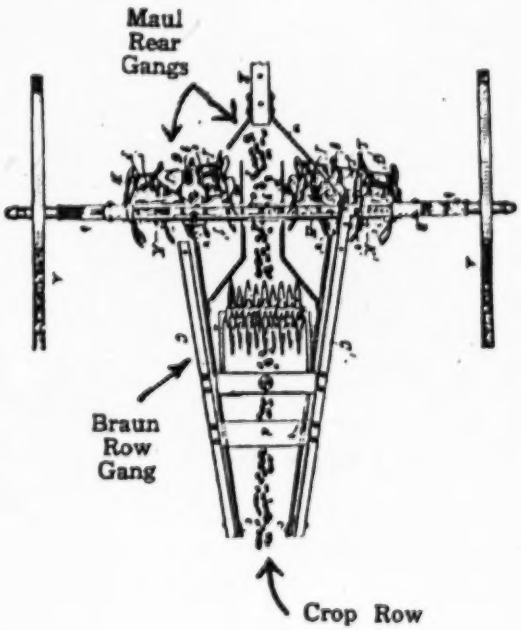
[2] A "rotary hoe" is a wheel or drum of protruding blades or tines. A "gang of rotary hoes" is a grouping of multiple rotary hoes in a single axle. (App. A4, S. App. SA7, 12 lines 19-20 Fig. 13).

A10 and A34). Prominent here are U.S. Patent No. 529,457 issued on November 20, 1894, to C. Maul (S. App. SA18) and U.S. Patent No. 1,908,110 issued on May 9, 1933, to O. Braun (S. App. SA24). Both these patents were relied upon before the trial and Appeals Courts.

The Maul Patent of 1894 shows the now conventional and now un-patentable farm implement having a pair of rear gangs of rotary hoes which cultivate on either side of a crop row, exactly as shown and claimed in the '271 Reissue Patent. It is not disputed that Maul also provided every adjustment for the rear gangs of rotary hoes—up, down, angling, and tilt—as is disclosed and claimed for the pair of rear gangs of the '271 Reissue Patent. So, the rear portion of the '271 Reissue Patent is unpatentably ancient and was "conventional" in 1933.

The Braun Patent of 1933 discloses "a rotary hoe attachment for conventional cultivators used for row crops" (S. App. SA 25 lines 2-4). Braun expressly teaches adding to the standard, conventional farm cultivator implement a single front gang of rotary hoes which rides up and down along and atop the crop row. Any patentable nonobviousness in a triangular configuration of soil cultivator tools was exhausted by Braun in 1933.



The Prior Sale Invalidity and Reissuance

The '387 patent originally in suit claimed on its face, pursuant to 35 U.S.C. §120, to be derived in part from prior patent applications dating to as early as March 18, 1959. In regard to that fact the trial Court found, in its opinion of June 2, 1978, that:

> "The Lehmans sold a cultivator embodying features covered by this patent to a Mr. Eugene Engels 'around the first of March' of 1958",

and concluded:

> . . . "it may very well be that there was a sale of the patented invention more than one year prior to March 18, 1959. . . . If so, the ['387] patent would be invalid under 35 U.S.C. §102(b)". App. at A6-7

The "if so" was fulfilled, so the original '387 patent was invalid as stated.

The facts of the prior sale invalidity were actually known to Lilliston as early as 1962. But it was not until after the "on sale" invalidity was pleaded in this suit that Lilliston sought to cure the invalidity. Its first effort to obtain a claim to priority of April 1, 1958, was via Patent Office certificate of correction (35 U.S.C. §254) (App. A42). Its petition was rejected by the Patent Office Solicitor in view of the need to protect "statutory intervening rights" afforded only by the reissue process against such a change in claim (App. A43). Lilliston did apply for a reissue patent, on September 21, 1973. The '271 Reissue Patent was granted on December 10, 1974.

The Rulings Below

A. On Intervening Rights

The trial Court's opinion never addressed or acknowledged Kelley's intervening rights defense, although there is no question that the issue was pleaded, tried, and briefed. The facts recited in the published opinion plainly raise an intervening rights issue.

The Appeals Court sought to convert that error of neglect into an affirmative act of denial by the trial Court. The Appeals Court ruled mistakenly that:

1. "A court, in its discretion, may recognize the 'intervening rights' of an infringer under the traditional, equitable doctrine now codified in Section 252 of Title 35 of the United States Code" (App. A35);
2. The intervening rights doctrine ". . . has no application where the crucial claims of the reissued patent are substantially identical to those of the original patent, 35 U.S.C. §252 . . ." (App. A36); and
3. The contention ". . . that the change in priority date constitutes the requisite change in the claims of the patent to justify . . . assertion of intervening rights" is without merit (App. A36n).

B. On Validity

On the validity/obviousness issue, the trial Court in its written memorandum discussed the patent to Maul, but did not discuss the pertinent, specific teaching of Braun (App. A10). The trial Court compounded that factual error by reformulating the obviousness test of *Graham* v. *John Deere & Co.* (*supra,* 383 U.S. at 17) into an erroneous test of "was the inventor the

first to combine the old elements"? Specifically the trial Court ruled:

> "The conclusion is that although the scope and content of the prior art encompassed all the elements found in the patent in suit, . . . the Lehmans were the first to combine the old elements in a way that produced a new, beneficial and unexpected result. It follows that the invention is not void for obviousness." (App. A11-12).

The Appeals Court did not discuss either the trial Court's clear error of fact in ignoring the Braun teaching or the trial Court's clear error of law in revising the obviousness test mandated in *Graham* v. *Deere*. The Court of Appeals neglected its judicial function in so failing to give due or express consideration to the errors alleged in the trial Court's decision.

REASONS FOR GRANTING THE WRIT

Review and Reversal to Confirm Absolute Intervening Rights Will Affirm the Federal Patent Policy that the Public is Not To Be Burdened by Invalid Patents

This Court has never reviewed the intervening rights sections of the 1952 Patent Statute. Its last examination of the developing intervening rights doctrine was forty years ago, in *Sontag Stores Co.* v. *Nut Co.,* 310 U.S. 281 (1940), when solely equitable principles prevailed.

Intervening rights are a statutory extension of the federal patent policy protecting the public against the burdens of invalid, defective patents. Under that policy, known inventions and developments which are not protected by a *valid* patent are, as they were meant to be, available to the public for its free use. *Lear, Inc.* v. *Adkins,* 395 U.S. 653, 668 (1969) (emphasis added); *Sears, Roebuck* v. *Stiffel Co.,* 376 U.S. 225, 230-1 (1964); *Compco Corp.* v. *Day-Brite Lighting Inc.,* 376 U.S. 234, 237 (1964). That policy is deeply rooted in the history of this country.

The constitutional mandate, Article 1 Section 8, authorizing patent rights was controversial at its inception because it encroached upon the public's right to the free use of available knowledge. For that reason the patent laws are stringent and precise, and must be strictly observed and applied. *Sears, supra,* at 230.

A patent which is invalid in view of a prior sale or public use of the invention (35 U.S.C. §102(b)) is invalid as to each of its claims.[3] Even where that invalidity

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[3] *Timely Products Corp.* v. *Arron,* 523 F.2d 288, 302 (2d Cir. 1975).

arises (as here) out of a failure to claim the benefit of an earlier filing date which would avoid the §102(b) bar, the patent and its subject matter claims are nonetheless invalid.[4]

Some types of errors which render a patent "inoperative or invalid" are made correctable through the statutory mechanism of reissue under 35 U.S.C. §251. Patentees thus may validate patents prospectively to remove alleged grounds of invalidity, and that procedure in fact now is being encouraged.[5] But that statutory right to correct an invalid patent is balanced by statutory obligations set forth in 35 U.S.C. §252, entitled "Effect of Reissue".

The second paragraph of 35 U.S.C. §252 is "not entirely a codification of the [prior] case law . . . and should be considered on its own terms." Frederico, *Commentary on the New Patent Act,* 35 U.S.C.A. 1, 45-46 (1952). It has never been reviewed by this Court. The first sentence relates to the new doctrine of absolute intervening rights and the second sentence relates to the old doctrine of equitable intervening rights. The first sentence, which is of concern here, is a statutory extension of the federal patent policy in that it establishes

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[4] E.g., *Sticker Industrial Co.* v. *Blaw-Knox Co.,* 405 F.2d 90, 93 (7th Cir. 1968).

[5] Filing of reissue applications prior to or during litigation to obtain "expert" Patent and Trademark Office rulings on novelty and obviousness in view of previously uncited prior art and on other grounds of invalidity was made possible by a 1977 change in the rules (37 C.F.R. §1.175 (a) (4)). Reissue applications are being encouraged by the District Courts, e.g., *Sheller Globe Corp.* v. *Mobay Chemical Corp.,* ..... F.Supp. ....., 204 U.S.P.Q. 1052, 1055-56 (E.D. Mich. 1980).

an absolute intervening right to the public of free use of an invention prior to the grant of the reissue. The only exception to application of that absolute right arises if the ". . . thing infringes a valid claim of the reissued patent which was in the original patent."

Because the invalidity of the original '387 patent was based upon a statutory bar under 35 U.S.C. §102(b), all of its claims also were invalid. Accordingly it is important to give consideration to the language of the absolute intervening right statute. Did the invalidity of the '387 original patent under 35 U.S.C. §102(b) negate the applicability of the phrase ". . . unless the . . . thing infringes a valid claim of the reissued patent which was in the original patent"? Such question has not been reviewed by this Court. In this case below, the Appeals Court recognized that an equitable intervening right could arise, and thus apparently that the exception is not applicable. However, then misreading the statute, it denied the existence of the parallel absolute intervening right under the statute. That inexplicable error calls for review and correction here.

Review of the federal patent policy of *Lear* v. *Adkins* and its progeny as it relates to intervening rights is especially important at this time, since the reissue rules have been changed and the Patent Office practice has been popularized to allow expedient review and correction of allegedly deficient patents.[6] The strong federal policy

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[6] Patent Office records show that the number of applications for reissue patents increased from 219 in 1960, to 344 in 1970, to 465 in 1975, to 657 in 1979. United States Patent & Trademark Office, Commissioner's Annual Report—1979, pg. 29.

against burdening the public with originally invalid patents until such time as the defects are removed by the reissue process can and should be vindicated in this case. The facts here and the public policy effects of the statute make review here timely, necessary, and important.

Review Is Necessary To Establish Conformity Between 35 U.S.C. §252 and the Policy Of Strict Statutory Construction

The policy of strict statutory construction is one ordered by our constitutional form of government guaranteeing the separation of powers. This Court has repeatedly cautioned against judicial encroachment and has stated that the judicial branch is without choice to carry out the letter of the law as set forth by the legislative branch. A court may not at its discretion ignore or interpret a federal statute plainly written.[7]

Yet in this case, the trial Court ignored the pleaded protection of intervening rights. In the Appeals Court, the plain language of the statute was misread and the trial Court's error worsened. Review is required here to direct the Appeals Court below to give reasoned effect to the language of the intervening rights statute.

Review Will Resolve Actual Conflicts As To The Effect of A Reissue Changing A Claim to Validating Benefit of an Earlier Application Priority

A claim to benefit of priority of an earlier application (35 U.S.C. §120) may be changed through reissue pro-

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[7] *Washington Market Co.* v. *Hoffman,* 101 U.S. 112, 115-16 (1879); *Dawson Chemical Co.* v. *Rohm & Haas Co.,* 48 U.S.L.W. 4908, 4911 (June 27, 1980).

cedures to negate the invalidating effect of a prior public use or sale. That was done here. But the availability of reissue procedures should not change the fact that the original claims to invention were invalid in law prior to the change of claim to priority under the reissue statute. The several decisions which treat this narrow subject show actual conflict and divergence of approach in this important area.

The courts in each of *State of Israel* v. *Brenner*,[8] 400 F.2d 789, 791-92 (D.C. Cir. 1968); *Sticker Industrial Supply Co.* v. *Blaw-Knox Co.*,[9] 321 F.Supp. 876, 880 (N.D. Ill. 1970); *Fontijn* v. *Okamoto*,[10] 518 F.2d 610, 621 (C.C. P.A. 1975); and *Kelley Mfg. Co.* v. *Lilliston Corp.*,[11] below, No. 78-1700 (4th Cir. February 28, 1980) (App. A33, A36n), suggested or held that only equitable rights are available where a priority claim is changed to obtain a valid reissue patent. The court in *St. Regis Paper Co.* v. *Bemis Co.*, 403 F.Supp. 776, 791-93 (S.D. Ill. 1975), reversed on other grounds, 549 F.2d 833 (7th Cir. 1977), squarely held that granting a reissue patent changed solely to claim an earlier priority date validated the original patent with "no substantive change", so that no intervening rights (absolute or equitable) would arise under the statute, which "merely codified equitable prin-

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[8] "§252 can be read . . . to protect a *deserving* third party. . . ."

[9] ". . . intervening right, if any, may be relevant to the final adjudication of the *equities*."

[10] ". . . *equitable* interests of any party . . . are adequately protected by . . . §252 . . ."

[11] ". . . Section 252 could come into play to protect . . . *equitable* interests. . . ."

ciples devolved under the prior law."[12] Other courts have recognized that both absolute and equitable rights arise where no valid claim of the original patent is retained unchanged in the reissue patent: *Wayne-Gossard Corp.* v. *Moretz Hosiery Mills, Inc.*,[13] 539 F.2d 986, 989 (4th Cir. 1976) (narrowed reissue claims); *Plastic Container Corp.* v. *Continental Plastics*,[14] 607 F.2d 885, 901 n.35 (10th Cir. 1979) (reissue claims broadened to cover device).

Review is necessary to bring into focus the circumstances under which the absolute rights of the statute are to be applied; it would be definitively instructive to the trial courts in which increasing numbers of reissue patents are being litigated, to eliminate the confusion which cases such as *St. Regis* and this case has caused.

The Trial Court's Obviousness Test, Grossly In Conflict With Graham v. Deere, Should Have Been Reversed on Appeal

Finally, a writ of certiorari should issue to require that the Court of Appeals below perform its judicial

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[12] Contrast Frederico, *Commentary on the New Patent Act*, 35 U.S.C.A. 1, 45-46: "The second paragraph of section 252 is not entirely a codification of the case law . . . it varies in some respects . . . and should be considered on its own terms."

[13] The first sentence of §252, second paragraph, "granted an absolute right . . .", although no claim for pre-reissuance damages was pressed, and "under the second sentence . . . the court '*may* provide for the continued manufacture use or sale' of the article . . . ."

[14] "An infringer has the unqualified right to continue to use or sell those . . . goods . . . made . . . prior to the reissue grant. . . ."

function in this case. The *Graham* v. *John Deere* standards mandated by this Court must be effected in each and every patent case involving the obviousness question.[15] As shown *supra* at 7-8, although the District Court recognized the *Graham* test, it actually ignored the combination of Braun and Maul and applied instead a unique, unwarranted test of whether the Lehmans were the "first" to make the combination (App. A12). That is not the obviousness test mandated by this Court in *Graham*.

For the trial Court to have applied its own test was a clear error of law which should have been corrected by the Appeals Court. The Appeals Court's apparent failure to examine Kelley's specific objection and to correct the abrupt departure from the *Graham* mandate call for exercise of this Court's supervisory responsibility.

CONCLUSION

It has been more than 20 years since this Court's decision in *Lear* v. *Adkins*, and its emphasis therein of federal patent policy. It is timely, particularly in view of the currently increased use of the reissue statute, to review and affirm that policy specifically as promulgated in 35 U.S.C. §252, guaranteeing an absolute intervening right in reissue cases as against invalid original patents.

In reviewing the reissue statute it is important to consider whether its language may be used to frustrate a party's absolute rights where the original patent was

[15] *Sakraida* v. *Ag Pro*, 425 U.S. 273, 279 (1976).

invalid because of a statutory bar under 35 U.S.C. §102 (b), regardless of whether the infringed reissue claims to invention were otherwise identical to the original patent claims.

Finally, the *Graham* v. *Deere* test of patentable obviousness or not under 35 U.S.C. §103 must be adhered to by the lower courts. The trial Court's "first to combine" test, in abrupt conflict with the *Graham* test, should have been scrutinized and reversed upon appeal.

It is urged that review of the opinion and judgment of the Court of Appeals below is appropriate and necessary. This Petition should be granted.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that three (3) copies of the foregoing PETITION FOR WRIT OF CERTIORARI with APPENDIX and of the accompanying SUPPLEMENTAL APPENDIX have been served by mail on counsel for respondent, addressed as follows: William A. Marshall, Merriam, Marshall & Bicknell, Two First National Plaza, Chicago, Illinois 60603, this 28th day of July, 1980.

APPENDIX TO PETITION FOR WRIT OF CERTIORARI

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APPENDIX TO PETITION FOR WRIT OF CERTIORARI

IN THE UNITED STATES DISTRICT COURT
For The Eastern District Of North Carolina
Wilson Division

KELLEY MANUFACTURING COMPANY,

Plaintiff,

vs.

LILLISTON CORPORATION,

Defendant.

CIVIL NO. 1295
JUN 2, 1978
John R. Whitty, Clerk
U.S. District Court
E. Dist. No. Car.

MEMORANDUM OF DECISION

Following dismissal of an action for patent infringement brought by Lilliston Corporation (Lilliston), a Georgia corporation, against Kelley Manufacturing Company (Kelley), another Georgia corporation, in the Southern District of Texas on improper venue gorunds Kelley instituted this declaratory judgment action in the Eastern District of North Carolina where Lilliston maintains a warehouse and conducts some business. The First Claim of plaintiff's complaint was severed for trial purposes and has been tried to the court without a jury on the issues of validity, enforceability and infringement of a patent held by Lilliston for a farm cultivator.[1] In this

[1] Kelley's Second and Third Claims allege violations by Lilliston of the antitrust laws; the Fourth Claim alleges violations of the unfair competition laws of North Carolina and Georgia; and the Fifth Claim charges Lilliston with infringement of a peanut harvesting machine. These claims have been reserved for trial at a later date.

memorandum of decision the court will record its findings of fact and conclusions of law as required by Rule 52(a), F.R.Civ.P. Jurisdiction is based on 28 U.S.C. §§ 1338 and 2201.

The patent in suit is United States Reissue Patent No. 28,271 (the '271 Reissue Patent) entitled "Cultivator" which issued originally as United States Patent No. 2,994,387 (the '387 Patent) on August 1, 1961 to Charles L. and Alvin H. Lehman and by them assigned to Lilliston in 1961. Plaintiff's complaint which originally attacked the validity of the '387 patent was amended following its reissue on December 10, 1974, but the complaint as amended did not essentially depart from the typically all-inclusive allegations usually found in patent litigation, that is to say, it alleged that the reissue patent is invalid, void and unenforceable because of the prior use, sale and disclosure of the patented invention; anticipation by the prior art; obviousness in view of the prior art; abandonment; file wrapper estoppel; new matter; failure to obtain a license to file foreign applications; failure to clearly disclose, define or distinctly claim the invention; failure to set forth the best mode contemplated by the inventors for carrying out the invention; claiming aggregations of parts of elements; inoperative disclosure, incapable of accomplishing the intended purpose; inutility; indefinite and overbroad claims; bad faith; intentional and material representations to the Patent Office and estoppel by reason of the same; patent misuse; and violation of the antitrust laws.

In an amended answer defendant denied all of plaintiff's allegations and in a counterclaim alleged infringement by plaintiff of Claims Eight, Ten — Thirteen and Twenty — Twenty-Four inclusive of the '271 reissue patent. Relief sought by the defendant on its counterclaim includes a permanent injunction against infringement of the patent by Kelley; damages for past infringement; punitive and treble damages because of the alleged willful and deliberate nature of Kelley's infringement; and costs and attorney's fees.

The patent in suit relates to an apparatus for cultivating crops planted in parallel rows, and the general objective of the invention is

> ". . . To provide a rotary cultivator having separate gangs of 'free-floating' rotary hoes which will engage the row crops with a greater force than heretofore possible with cultivators having conventional free-floating gangs of hoes."

After listing some ten or more additional objects of the invention (see Appendix A attached hereto) the patent states that

> "These and other objects are accomplished in accordance with this invention, by a cultivator which comprises a frame adapted to be moved forwardly over the ground and a plurality of separate gangs which are mounted from the frame for swinging about a transverse axis to rotatably engage spaced-apart rows of crops in a laterally extending row during forward movement of the frame. Each such gang is also swingable about a vertical axis to adjust the angular relation of the path of rotation of the hoes thereof with respect to the rows; and means are carried by the frame for turning the ground intermediate adjacent rows of crops and rearwardly of the engagement therewith of the gangs with the crops."

Typical of the claims in suit is Claim Twenty which reads:

> "20. A cultivator, comprising a frame adapted to be moved forwardly over the ground, a gang of rotary hoes mounted on the frame for swinging about a transverse axis to rotatably engage a row of crops during forward movement of the frame, a pair of additional gangs of rotary hoes each mounted from the frame for swinging about a transverse axis to rotatably engage the ground on each opposite side of the row of crops and rearwardly of the engagement of the hoes of the first-mentioned gang therewith during forward movement of the frame, and means for ad-

justing the angular relation of the path of the rotation of the hoes of each gang with respect to the forward movement of the frame."

A rotary hoe in farm machinery parlance can be likened to a metal wheel (usually about ten to fifteen inches in diameter) from which the rim has been removed leaving the spokes to engage and till the soil as the rotary hoe moves over the ground. The name probably derives from the fact that in earlier models the ends of the spokes were shaped like small hoes which enabled them to engage the ground with a digging action. In more recent versions the spokes have been arcuate in form and their leading edges have been sharpened so that they engage the ground with a slicing action. These are called "slicer tines", but they still fit within the generic term of rotary hoe.[2]

When more than one rotary hoe is mounted on the same axle it is called a "gang of rotary hoes."

Since the parties agree that all of the elements required by the patent in suit were old in the art at the time of its orginal issue, we are concerned here with a combination patent, and the principal issue on the question of validity is whether or not the manner in which the Lehman brothers arranged these elements and provided for their adjustment constituted patentable invention. The problems which the inventors were seeking to solve were stated in the opening paragraphs of the patent as follows:

> "In a conventional rotary cultivator, rotary hoes are fixedly secured across the width of a frame in multiple rows so that, as the frame is moved forwardly, the ends of the legs of each hoe successively penetrate the ground to break up its upper crust. If, however, the ground is not level, the crops from the high rows may be pulled up due to the concentrated weight of the hoes imposed upon them, while the low rows may not even be touched by the hoes.

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[2] Jack C. Whitesides, formerly a design engineer of Lilliston and now a Kelley Vice-President, holds U. S. Patent No. 3,232,356 which covers a slicer tine tool, but the title of the patent is "Rotary Hoe".

Still further difficulty is encountered when the crops to be cultivated are planted either high on a row or deep in a row.

"Ordinarily, weeds are rooted only in the surface crust of the ground above the more deep-rooted crops such that they may be pulled up by the rotary hoes without damage to the crops themselves. When the crops are high, it is desirable to kill off the chopped weeds by covering them with dirt from between the rows. It may also be desirable to build up the row in order to facilitate operation of a mechanical picker or the like. On the other hand, when the crops are low, caution should be taken to see that they are not covered by dirt from between the rows."

To solve these problems the inventors experimented with running a gang of rotary hoes directly over the crop row but angled so as to displace the soil laterally instead of following the row straight on as had previous rotary hoe arrangements. This angled gang (called the "row gang") was followed by two gangs of rotary hoes, one on each side of the row (called "rear gangs") each of which was equipped with means to angle it so as to allow soil to be thrown toward or away from the row. In addition to being thus pivotable about a vertical axis the row gang and the rear gangs were each individually mounted to pivot about a transverse axis which enabled them to be "free-floating" and thus to follow more closely the contour of the row being cultivated. Finally, means were provided for tilting the gangs with respect to the vertical plane.[3] This triangular arrangement of the rotary

[3] Also stressed in the description of the invention was the feature of pivotally mounting the gangs from the frame "for swinging about an axis rearwardly of the engagement of the hoes of such gang with the ground." This arrangement, it was asserted, enabled the hoes to engage the ground with a "pushing" action which resulted in penetration of the ground with "a greater force than the conventional 'pulled' type of hoes." Witnesses at the trial did not ascribe any particular virtue to this feature.

hoes could, of course, be repeated several times on one supporting frame thus allowing several rows to be cultivated at once.

Surprisingly, when this arrangement of angularly-adjustable, free-floating rotary hoes was run over a row of crops it was found that the soil could be cultivated across the top of the row between the plants as well as alongside them, whereas the more conventional arrangements had permitted cultivation only alongside the plants leaving an uncultivated strip along the top of the row. Moreover, it was found that damage to the crops themselves was far less than anticipated, and was in fact quite acceptable. Since this happy result eliminated much of the hand hoeing which had previously been necessary where conventional cultivators were used, it came to be called "once-over, all-over" cultivation.[4]

VALIDITY

Of the multiple charges of invalidity mounted by plaintiff against the '371 reissue patent the court deems the following worthy of discussion.

1. *Prior Use, Sale and Disclosure.*

The Lehmans began work on their invention as early as 1956, and they filed two applications for patents on April 1, 1958. They next filed a continuation-in-part application on March 18, 1959, which included the subject matter of the two prior applications and introduced new matter. On September 7, 1960 a fourth application was filed, and on June 12, 1961 the final application was filed which combined the 1959 and 1960 applications into a single application which matured into the original patent in suit, No. 2,994,387.

The Lehmans sold a cultivator embodying features covered by this patent to a Mr. Eugene Engels "around the

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[4] The term is not used in the patent itself, but the words "once-over" were used in the course of the prosecution of the patent and appear at pages 51 *et seq.* of the file wrapper.

first of March" of 1958. Thus it may very well be that there was a sale of the patented invention more than one year prior to March 18, 1959, the date of the first application referred to in the '387 patent. If so, the patent would be invalid under 35 U.S.C. § 102(b).[5] During the pendency of this action, however, Lilliston applied for and obtained reissuance of the '387 patent as the '271 reissue patent in order to incorporate the filing date of the first Lehman application, that is, April 1, 1958.[6] Since the only evidence of a prior use, sale or disclosure showed it to have been well within one year prior to April 1, 1958, the prior sale charge has not been sustained.

2. *Anticipation by the Prior Art.*

In an infringement suit brought by Lilliston in the Southern District of Texas shortly after the issuance of the '387 patent Judge Reynaldo Garza held the patent valid and in the course of his opinion wrote:

> "There is no question that the patent in suit involves an invention which has been made in a very highly developed and crowded field. The defendant cited more than 80 prior art patents and publications, but at the trial relied mainly upon the Bonds Patent No. 1,249,008, issued in 1917." *Lilliston Implement Company* v. *E. L. Caldwell & Sons, Inc.,* 212 F.Supp. 413, 419 (S.D.Tex. 1962).

While conceding that no claim of the patent in suit is fully anticipated by any single prior art cultivator, the

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[5] The matter is discussed in more detail in *Kelley* v. *Lilliston,* ..... F.Supp. ....., 180 USPQ 364 (E.D.N.C. 1973), in which this court denied plaintiff's motion for summary judgment based on nine separate grounds which included the "on-sale" charge.

[6] In accordance with procedure then in effect this earliest date had not been brought forward in the prosecution as a continuation-in-part of the '387 patent. The only effect of the reissuance was to give the '387 patent the earlier effective date.

plaintiff here has cited over 300 references against the patent and has strongly maintained that when the claims are given the "broad interpretation" contended for by Lilliston they "read on" one or more prior art cultivators. Of the many references cited plaintiff places principal reliance on these twelve patents:

Braun 1,908,110 (PX 10-91)
Remy French 1,104,111 (PX 12-115 and PX 13-116)
Walker 2,227,772 (PX 27-112)
Burns 2,243,241 (PX 55-233)
Ogden 675,968 (PX 11-87)
Maul 529,457 (PX 14-143)
Charley 2,655,083 (PX 41-326)
Newton 1,681,464 (PX 39-325)
Friend 2,579,561 (PX 40-324)
Benjamin 1,760,336 (PX 33-95)
Christensen, et al. 1,043,202 (PX 49-140)
Christofferson 949,218 (PX 48-89)

An examination of these patents reveals that while they all contain one or more of the elements which admittedly were old in the art in 1958(discs, rotary hoes, scratcher teeth, shovels, sweeps, etc.) and means to angle, tilt and "free-float" them, none of them discloses the triangular arrangement of angularly-adjustable, free-floating rotary hoes of the Lehman patent designed to run over a row of crops and cultivate the soil around and adjacent to the plants.

> "It is suggested . . . that [the patent in suit] is nothing more than an aggregation of elements old in the art and as such it comes within the rules of *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U.S. 147. Of course, to establish anticipation in such a situation, it is not necessary that all of the elements be found in a single patent or publication. It is enough if the whole of the prior art considered together discloses all of the claimed elements and that no new functional relationship arises from their combination. . . . In order to anticipate a patent for a combination, the prior

art must disclose all of the elements of such combination or their mechanical equivalents, functioning in substantially the same way to produce substantially the same result. . . . Rudimentary or unsuccessful experiments with isolated elements of a combination do not anticipate an invention which successfully combines those elements. . . . And, '* * * whoever finally perfects and improves a device and renders it capable of practical, useful and effective operation is entitled to a patent although others had the idea and made experiments toward putting it into practice.* * *'. . . ." (Citations omitted.) *McCullough Tool Company* v. *Well Surveys, Inc.*, 343 F.2d 381. 398-99 (10th Cir. 1965), *cert denied*, 383 U.S. 933 (1966).

Application of these principles to the case at bar has led to the conclusion that the '371 reissue patent is not anticipated by the prior art. While the whole of the prior art considered together discloses all of the claimed elements, the prior art does not disclose all of the elements or their mechanical equivalents functioning in substantially the same way to produce substantially the same result as the patent in suit.

3. *Obviousness.*

35 U.S.C. § 103 provides in pertinent part that:

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. . . ."

Application of the statute requires considerations of (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; and (3) the level of ordinary skill in the art at the time the invention was made. *Graham* v. *John Deere Company* [sic], 383 U.S. 1, 17 (1966).

(a). *Scope and Content of the Prior Art.*

As previously indicated, the field of mechanical implements for cultivating growing crops and tilling the soil is a very highly developed and crowded one. At the time of the invention in suit it included all cultivating and tillage equipment such as rotary hoes, discs, shovels, sweeps and scratcher teeth, means for disposing, arranging and moving the same over the ground and means for adjusting the same with reference to the horizontal and vertical planes. Not surprisingly, therefore, the parties here have readily agreed that the implements employed in the Lehman patent introduced no new element into the art.

(b). *Differences Between the Prior Art and the Claims at Issue.*

As early as 1894 a patent was issued (Maul No. 529,-457) on a cultivator having two gangs of free-floating "spading teeth" designed to run on opposite sides of a row of crops, but a front/rear rotary tool arrangement was not disclosed. U.S. Patent No. 675,968 issued to Ogden in 1901 disclosed a machine which could be converted from a cotton chopper into a cultivator. Free-floating, cylindrical drums with protruding cultivating teeth served as rotary hoes which were angularly adjustable. As an optional feature a "lister attachment" carrying a "plurality of teeth or shovels" for banking the soil on either side of the row could be mounted rearwardly of the "toothed cylinders". The patent did not disclose means for angling these rear gangs of shovels. In 1939 U.S. Patent No. 2,227,772 was issued to Walker on a cultivator which disclosed rotatable gangs of staggered, sharp-edged blades designed to travel on opposite sides of the row close to the plants. Rearward of these rotary blades shovels were mounted on the same beams which were pivotally attached to the frame forward of the blades. The patent did not disclose an arrangement for allowing the blades to cultivate across the top of the row.

Patents had been issued on numerous other cultivators prior to 1958, but the foregoing are representative of

those cited by the plaintiff in support of its charge of obviousness. From all the cited prior art the court has concluded that the principal difference between the prior art and the claims in issue here (Claims 8, 10-13, and 20-24) lies in the fact that in no prior cultivator had there been an arrangement of a row gang of rotary hoes and two rear gangs of rotary hoes, each separately mounted and free-floating and each angularly adjustable so as to permit "rotatable engagement" of the row of crops with maximum destruction of weeds and grasses and minimal damage to the crops themselves.

(c). *The Level of Ordinary Skill in the Art.*

It was suggested by Judge Garza in the *Caldwell* decision that the ordinary farmer would be a person of ordinary skill in the art of farm machinery design and construction. While numerous patents have issued to farmers (including the Lehmans in this case) on such machinery, ordinarily the level of skill in the mechanical arts is that of persons engaged in the design and manufacture of machinery rather than that of its users. Here the plaintiff contends that a person of ordinary skill in the art has at least the skill of a graduate agricultural engineer.[7] The court would not go so far, but the evidence does support the finding that the level of skill in the art was reasonably high. Many people were at work in this field which, as noted before, had become highly developed and crowded. Even so, no one had put together this combination of old elements in the manner and configuration which gave the much desired results previously mentioned.

The conclusion is that although the scope and content of the prior art encompassed all the elements found in the patent in suit, there are significant differences between

[7] Significantly, plaintiff's expert, Dr. Stanley J. Clark, himself a graduate agricultural engineer, who had been employed by the John Deere Company, was not asked by plaintiff if the patent in suit would have been obvious to him prior to 1958.

the prior art and the claims at issue here and that notwithstanding the level of ordinary skill in the art was reasonably high, the Lehmans were the first to combine the old elements in a way that produced a new, beneficial and unexpected result. It follows that the invention is not void for obviousness.

Adding weight to this conclusion are the so-called secondary considerations, all supported by evidence in this case, of long-felt need for a machine that would eliminate or minimize hand-hoeing; the large number of people who were working on the problem; the fact that most of the elements finally combined by the Lehmans had been known in the art for over fifty years; the skepticism exhibited by many as to whether the invention would work; copying of the invention by established farm machinery manufacturers; the immediate acquisition by Lilliston of the patent rights for a substantial consideration followed by the payment of substantial royalties to the inventors; and the considerable commercial success which Lilliston has experienced in marketing equipment embodying the patented features.[8]

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[8] There is a growing body of opinion that these secondary considerations shoud actually be regarded as of primary importance in determining obviousness under Section 103. *See Reeves Instrument Corporation* v. *Beckman Instruments, Inc.,* 444 F.2d 263 (9th Cir. 1971), and "Laying the Ghost of the 'Invention' Requirement" by the Honorable Giles A. Rich, Associate Judge of the United States Court of Customs and Patent Appeals, a speech given to the Los Angeles Patent Law Association on September 18, 1972. Adoption of these views would certainly alleviate some of the difficulty experienced by the courts in applying what Judge Learned Hand described as "perhaps the most baffling concept in the whole catalog of judicial efforts. . . ." *Lyon* v. *Bausch & Lomb Optical Company,* 224 F.2d 530, 536 (2nd Cir. 1955).

4. *Failure to Clearly Define or Distinctly Claim the Invention.*[9]

Finally, plaintiff strenuously argues that the claims at issue do not particularly point out and distinctly claim the subject matter of the invention as required by 35 U.S.C. § 112. Central to plaintiff's arguments is the contention that the inventive concept claimed by defendant for the invention, namely, that the "cooperative effect" between the combination of the row gangs of rotary hoes and the rear gangs embodied in the claims at issue produces an unusual and unexpected "once-over, all-over" cultivation result, is nowhere spelled out in the patent which is totally lacking in instruction as to exactly how the elements should be arranged to achieve this "cooperative effect".[10] From this factually indisputable premise

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[9] Another position advanced by plaintiff in the pleadings and pre-trial proceedings was the alleged failure of the patent's specification to disclose the manner and process of making the invention in such full, clear, concise and exact terms as to enable persons skilled in the art to make and use the same as required by 35 U.S.C. § 112, but this issue was determined against the plaintiff on its summary judgment motion, *Kelley Manufacturing Company* v. *Lilliston Corporation, supra,* and has not been brought forward in plaintiff's post-trial brief.

[10] The court is under the impression that Lilliston's emphasis on "cooperative effect" may bear a closer relationship to the perceived necessity of demonstrating a "synergistic" result in the light of *Sakraida* v. *Ag Pro, Inc.*, 425 U.S. 273 (1976), and *Anderson's-Black Rock* v. *Pavement Salvage Company,* 396 U.S. 57 (1969), than to anything the Lehmans had in mind as they were working on their invention. The fact remains, however, that the arrangement of the admittedly old elements finally arrived at by them and disclosed in the claims in issue did produce a new, long-sought and beneficial result. That they may not have understood precisely the principles underlying the invention is not fatal to the patent.

> "A patentee may be baldly empirical, seeing nothing beyond his experiments and the result; yet if he has

plaintiff goes on to argue that since the patent does not teach how others may avoid infringing it, it does not satisfy the definiteness requirements of Section 112, citing *General Electric Company* v. *Wabash Appliance Corporation,* 304 U.S. 364 (1938), and *United Carbon Company* v. *Binney & Smith Company,* 317 U.S. 228 (1942).[11]

While it is true that specific directions are not given for the adjustment of the elements to fit all conditions, the claims in issue do disclose in general terms arrangements of the row gangs and rear gangs which enable them to achieve a cooperative effect when properly adjusted for crop and soil conditions, and the evidence establishes to the court's satisfaction that this effect does take place. As the row gang cultivates over the row and removes dirt from around and between the plants it is immediately replaced by dirt thrown toward the row by the rear gangs. This may not rescue as many dislodged plants from "impending death" by restoring them to an upright

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[10] (Continued)

> added a new and valuable article to the world's utilities he is entitled to the rank and protection of an inventor. And how can it take from his merit that he may not know all the forces which he has brought into operation? It is certainly not necessary that he understand or be able to state the scientific principles underlying his invention, and it is immaterial whether he can stand a successful examination as to the speculative ideas involved." *Diamond Rubber Company* v. *Consolidated Rubber Tire Company,* 220 U.S. 428, 435-36 (1911).

[11] Plaintiff also argues that the terms "rotary hoe" and "rotatably engage" are not properly defined in the patent, but the court finds that these terms were widely used and understood in the art. As previously noted "rotary hoe" was understood to include a variety of tools and was used by Mr. Whitesides, now a Kelley Vice-President, to label his invention of a "slicer tine". Whitesides also used the term "rotatably engaging" in a patent issued to him on the Kelley cultivator in 1974. PX 10-100, Columns 4, 5 and 6, Claims 1, 2, 3, 5 and 8.

position as one of defendant's witnesses would have us believe, but it provides a highly effective method of weed and grass control while mulching and aerating the soil with minimal damage to the crops, the results in which farmers are most interested. The fact that the farmer himself must experiment and make adjustments to fit particular conditions does not invalidate the patent for indefiniteness. *Procter & Gamble Manufacturing Company* v. *Refining, Inc.*, 135 F.2d 900 (4th Cir. 1943).

Plaintiff's contention that the patent does not teach how one can avoid infringing it is perhaps best answered in this exchange between counsel for plaintiff and defendant's expert witness:

> Q. If I as a non-Lilliston person, but interested in the art of cultivation, and looking with a view toward developing a cultivator of my own, were to examine U. S. Reissue Patent No. 28,271 . . . where would I find language sufficiently clear that I could determine how to build a cultivator that did not have what you characterized as the "inter-reaction" between front and rear gangs?
>
> A. I am not sure you would find language specifically dealing with that. The purpose of a patent is to tell you what you build to be within the patent. That is, the purpose of the patent is to define the invention and to claim the invention. That is clearly defined in the patent. If you understood that, then there are many things around the periphery that you could build avoiding the patent. The patent's purpose is not to say you can build this and not infringe; you can build that and not infringe; you can build something else and not infringe. The purpose of the patent is to define the metes and bounds of what is within the patent, not to tell you what you can build and not build within the patent (Tr. 9, pp. 1753-55).

The cases cited by plaintiff, *General Electric* and *United Carbon, supra,* are distinguishable and are not regarded as controlling here.

In summary the court is of opinion that Kelley has not carried its heavy burden of establishing by preponderance of the evidence its charges of invalidity based on prior use, sale and disclosure, anticipation by the prior art, obviousness and failure to clearly define or distinctly claim the invention. The court is strengthened in this conclusion by the fact that the Patent Office has twice found the invention patentable (*see Tights, Inc.* v. *Acme-McCrary Corporation,* 541 F.2d 1047, 1051 (4th Cir. 1976)); the fact that in the only court test of the patent in suit which went to final judgment the patent was held valid, *Lilliston Implement Company* v. *Caldwell, supra;* and the fact that two major farm implement manufacturers, John Deere Company and International Harvester, settled infringement actions brought against them by Lilliston and agreed to cease manufacturing their allegedly infringing machinery. PX 42 and 43. It follows that Claims 8, 10 - 13, and 20 - 24 of the '271 reissue patent are valid. The court has carefully considered plaintiff's other charges of invalidity, some of which were previously disposed of in the rulings made on plaintiff's motion for summary judgment previously referred to, but none has been found supported by evidence considered adequate to change this result.

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In addition to the facts found by the court on the issue of validity the court adopts as its own the following proposed findings of fact and conclusions submitted post-trial by the defendant on this issue: Nos. 4.01 - 4.07 inclusive; Nos. 5.10 - 5.14 inclusive; Nos. 6.01 - 6.09 inclusive; Nos. 9.01 - 9.04 inclusive; Nos. 12.02, 12.03, 12.05 - 12.10 inclusive; Nos. 12.17 - 12.23 inclusive; Nos. 12.25, 12.34 and 13.01 - 13.12 inclusive.

INFRINGEMENT

In its counterclaim for infringement Lilliston alleges that Kelley's 400 Series KMC Cultivator contains each of the elements in the '271 reissue patent and that they are normally arranged to produce the identical once-over, all-over cultivation result achieved by the patented invention. In denying infringement Kelley conceded that its cultivator may bear some resemblance to the cultivator now being made and sold by Lilliston, but it denies that Lilliston's present cultivator embodies the patented invention and alleges many distinguishing features between its cultivator and the one actually disclosed in the patent. To obviate this argument the court will disregard the current version of the Lilliston cultivator and will refer to a diagram (Figure 1 below) of the Lehman cultivator as shown (substantially) in the patent and a diagram (Figure 2) of the Kelley cultivator as made and sold today.

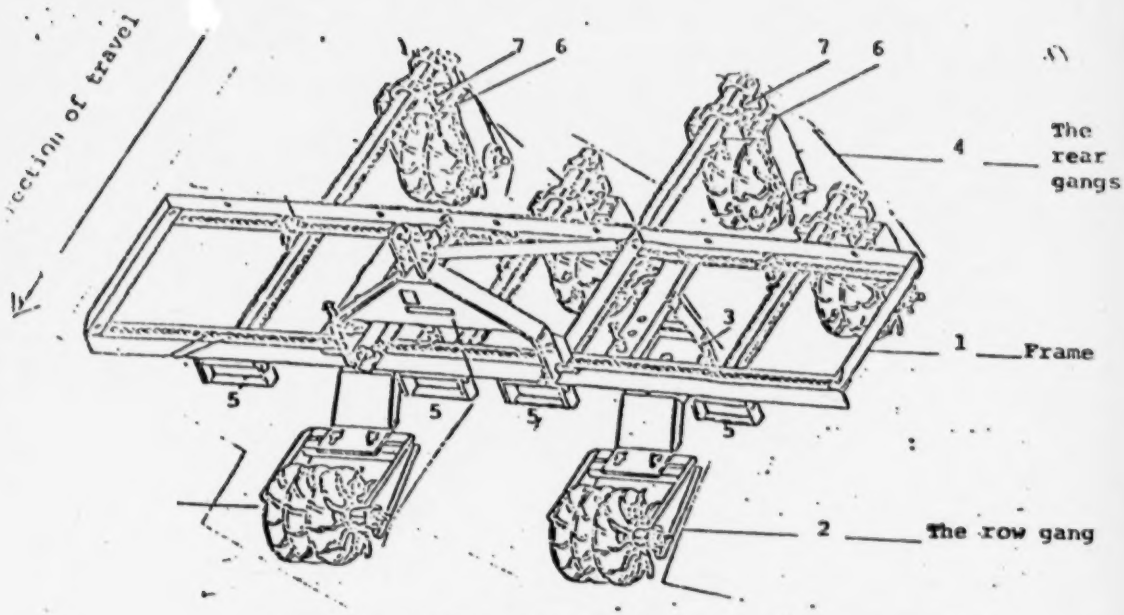

Figure 1. The Lehman Cultivator (two row sections)

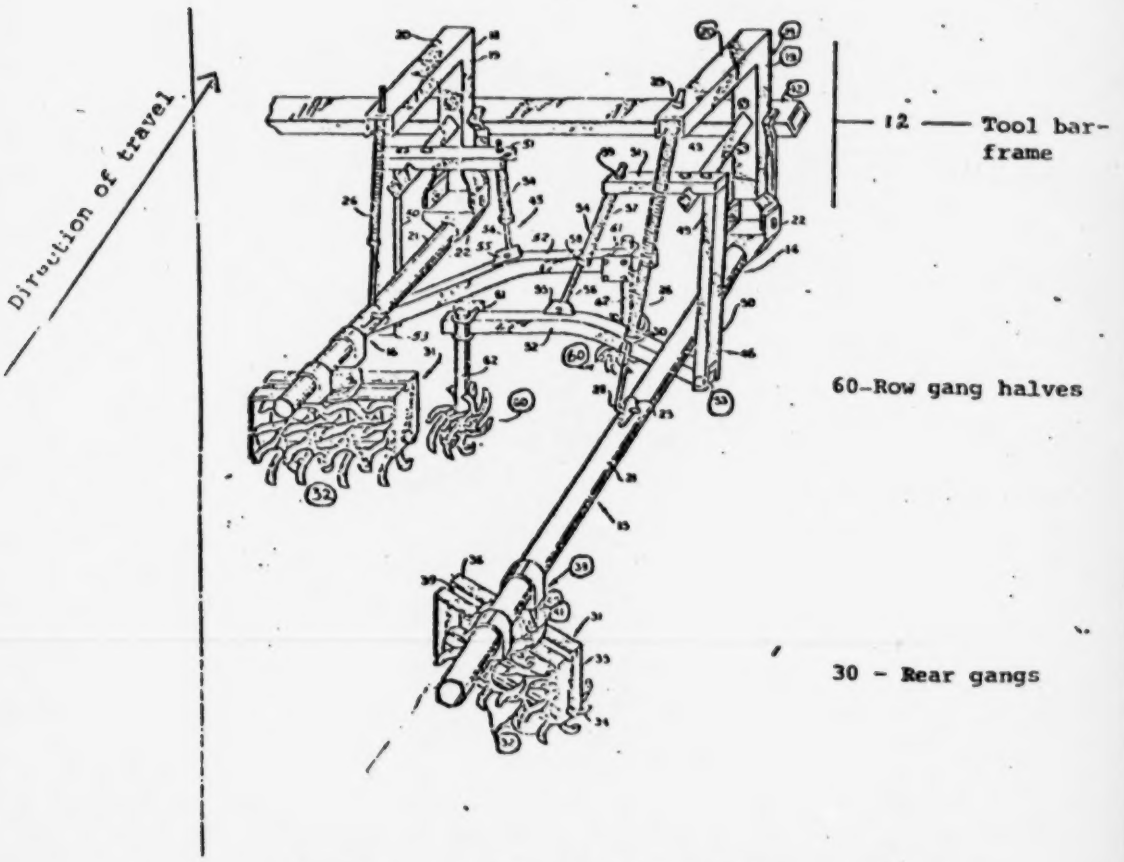

Figure 2. The Kelley Cultivator (one row section)

Claims 8, 10-13 and 20-24 of the patent in suit alleged by Kelley to be invalid are alleged by Lilliston to be infringed. As stated before, Claim 20 is representative of these claims, and we begin by comparing its embodiment in the original Lehman cultivator as shown in Figure 1 with the features of the Kelley cultivator as shown in Figure 2. In the language of Claim 20 the Lehman machine shows:

> A cultivator, comprising
>
> A frame (1) adapted to be moved forwardly over the ground,
>
> A gang of rotary hoes (2),
>
> Mounted on the frame for swinging about a transverse axis (3) to rotatably engage a row of crops during forward movement of the frame,
>
> A pair of additional gangs of rotary hoes (4),
>
> Each mounted from the frame for swinging about a transverse axis (5) to rotatably engage the ground on each opposite side of the row of crops and rearwardly of the engagement of the hoes of the first mentioned gang therewith during forward movement of the frame, and
>
> Means (6) for adjusting the angular relation of the path of rotation of the hoes of each gang with respect to the forward movement of the frame.

Claim 21 which is dependent on Claim 20 only adds

> Means (7) for adjusting and fixing the angular relation of each gang of said pair of gangs with respect to the ground level between positions tilted from one side to the other of a level position.

The Kelley cultivator in Figure 2 by comparison shows (again in Claim 20's language except where shown in brackets):

> A cultivator, comprising
>
> A frame (12), (18), (19), (20) adapted to be moved forwardly over the ground,

A [two-half] gang[s] of rotary hoes (60),

[Each] mounted on the frame for swinging about a [longitudinal] axis (53) to rotatably engage a row of crops during forward movement of the frame,

A pair of additional gangs of rotary hoes (32),

Each mounted from the frame for swinging about a transverse axis (22) to rotatably engage the ground on each opposite side of the row of crops and rearwardly of the engagement of the hoes of the first-mentioned gang therewith during forward movement of the frame, and

Means (40), (41) for adjusting the angular relation of the path of rotation of the hoes of each gang with respect to the forward movement of the frame.

And continuing the comparison with Claim 21 of the patent the Kelley cultivator also shows:

Means (38) for adjusting and fixing the angular relation of each gang of said pair of gangs with respect to the ground level and between positions titled from one side to the other of a level position.

It is readily apparent from the foregoing comparisons that with respect to the rear gangs of rotary hoes on the two cultivators Claims 20 and 21 of the patent in suit read directly on the Kelley cultivator, and the court has no hesitance in so holding.[12] The inquiries before the court are thus narrowed to two:

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[12] Plaintiff makes the point that the slicer tine-type rotary tools used in the Kelley cultivator differ materially from the earlier type rotary hoe disclosed in the '271 reissue patent, not only in form but in the result it achieves, and that this serves to avoid infringement. As has been seen, however, the slicer tine tools classify as rotary hoes, and given the virtually unlimited adjustments available for the rotary hoes on these machines, the court is not persuaded that there is any substantial difference in the results achievable by the various types of rotary tools that may be employed.

1. Does the row gang of the Kelley cultivator which consists of two half gangs suspended from two separate arms each mounted to swing about a "longitudinal" axis, that is, one parallel to the machine's direction of travel, equate with the single row gang of the Lehman cultivator operating off one axle and mounted to swing about a transverse axis, that is, one perpendicular to the direction of travel?

2. If so, is the Kelley cultivator designed to and does it achieve the same once-over, all-over cultivation result as the cultivators built in accordance with the patent in suit?

Lilliston confidently asserts that each of these questions should be answered in the affirmative and that the patent should therefore be held infringed. Kelley, on the other hand, insists that the patent requires a single front gang of rotary hoes mounted "for swinging about a transverse axis to cultivate the soil between the plants along the drill of a row of crops with a non-destructive combing action" and that the Kelley cultivator not only lacks such an element but that it is "not for the purpose of performing, and cannot perform the particular method of cultivating disclosed in the patents." The Kelley cultivators, so the argument goes, are simply "for the purpose of performing a conventional method of cultivating unlike that performed by the invention claimed by the patents in suit."[13]

The court has concluded that in addition to the identity of the rear gang elements of the two machines and the common purpose they serve, the row gang elements in the Kelley cultivator are substantially and functionally equivalent to the row gang of the Lehman cultivator, and when the Kelley cultivator with its triangular arrange-

[13] Implicit in this argument is the suggestion that the Lehman cultivators do indeed produce a result different from that achieved by conventional cultivators, a proposition which plaintiff spent much trial time and not a little briefing trying to refute.

ment of angularly-adjustable, free-floating rotary hoes is run over a row of crops, it is capable of practicing and does in fact practice the invention embodied in the claims in issue.

There is nothing in the patent which limits the row gang to a single gang mounted on one axle, and the fact that the patent drawings do not show a split front gang or other possible arrangements of the elements that might be infringing does not avoid infringement.[14] *Straussler* v. *United States,* 154 Ct. Cl. 275, 290 F.2d 827 (1961).

Although the matter of the mounting of the Lehman row gang on a transverse axis vis-a-vis the Kelley row gang's mounting on a longitudinal axis was debated at length during the trial and in the briefs, the court is not persuaded that the difference between the two mountings is a material one. The object of allowing the gangs to swing about any axis is simply to allow them to "float" freely and follow the contour of the ground in order to achieve closer cultivation of the entire surface.[15]

The question of whether the Kelley cultivator is designed to and does in fact achieve the same once-over, all-over cultivation result as cultivators built in accordance with the patent in suit must also be answered in the affirmative. This conclusion follows from the close sim-

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[14] In 1962 Lilliston began using the split row gang on its cultivators and mounting them on a parallel linkage device patented by Mr. Whitesides (DX 11-71, U.S. Patent No. 3,203,487), who was then with Lilliston. The split gangs continued to "free-float" together on a transverse axis and to remain laterally adjustable so as to achieve "rotatable engagement" with the row crops.

[15] It is true, as plaintiff's expert, Dr. Stanley Clark, testified, that this mounting of the Kelley row gangs causes them to describe arcs in the vertical plane which action may in turn bring the rotary hoes slightly closer to or slightly further away from the plants as they go up and down with the contour of the row, but the court is convinced that the effect of this, if any, on the cultivating result is minimal.

ilarity between the manner in which the Kelley cultivator is advertised to operate, from the testimony of witnesses who have observed and compared the operation of the cultivators in the fields and from the movies of these operations as shown by Lilliston during the trial.[16]

To begin with, the Kelley cultivator is built in accordance with U.S. Patent No. 3,794,123 (DX 10-100) issued to Jack C. Whitesides after he left Lilliston and joined Kelley. The diagram shown in Figure 2, *supra,* is adapted from the diagram shown in that patent. The Whitesides invention is summarized in the patent as follows:

> "Briefly described, the present invention comprises a cultivator which utilizes a plurality of independently suspended rotary hoe gangs to till the soil along a plurality of crop rows. The rotary hoe gangs are mounted on a framework and are adjustable with respect to the framework so that the gangs of rotary hoes can be positioned in various different arrangements, including arrangements where virtually all of the soil along a crop row can be tilled without leaving any untilled portions. The cultivator has its rotary hoe gangs arranged in groups for each crop row, with each group including one pair of rotary hoe gangs each being swingable about an axis normally extending along the crop row, and a second pair of rotary hoe gangs each being swingable about an axis extending normally transverse to the crop row. The first pair of rotary hoe gangs are each mounted on a laterally extending support leg which extends across the crop row from its respective rotary hoe gang, and the rotary hoe gang of each laterally extending support leg can be positioned along the length of its support leg in overlapping or spaced relationship

[16] Kelley's expert, Dr. Clark, gave testimony to the contrary, but the experiments which he described appear to have been controlled and did not include several of the experiments performed by defendant's experts. Significantly, Kelley brought no movies to the trial to illustrate the testimony of its witnesses.

with respect to the other rotary hoe gangs of the group in various lateral positions along the crop row to be tilled by the group of rotary hoes." (Col. 1, Lines 37-60)

Claim 1 of the Whitesides patent reads:

"A cultivator comprising a framework for towing by a tractor or the like in a forward direction over the ground along crop rows, a first gang of rotary hoes mounted on said framework for rotatably engaging a crop row closely adjacent the crop in the crop row and arranged to swing with respect to said framework about an axis extending normally approximately parallel to the direction of forward movement of said framework and laterally displaced from the first gang of rotary hoes across the crop row, and a second gang of rotary hoes mounted on said framework for rotatably engaging a crop row further away from the crop in the crop row than said first gang and arranged to swing with respect to said framework about an axis extending transverse to the direction of forward movement of said framework." (Col. 4, Lines 52-67)

Other claims in the patent are similar, and it is perfectly apparent to the court that Whitesides was making a conscious effort to patent a cultivator that would do everything the Lilliston cultivator would do and at the same time, it is assumed, he wished to avoid infringement of the Lehman patent if possible.[17]

". . . If the inventive idea of the original patentee has been appropriated, and the alleged infringing device contains the material features of the patent in suit, the court will declare infringement, even when those features have been supplemented or modified to such an extent that the defendant may be en-

[17] No presumption that the Kelley cultivator does not infringe arises from the fact that Whitesides was issued a patent on the independent suspension for the row gang halves which is claimed to be an improvement over the suspension systems disclosed in the '271 reissue patent.

titled to a patent for the improvement." *Crown Cork & Seal Company* v. *Aluminum Stopper Company*, 108 F. 845, 866 (4th Cir. 1901)

The close similarity between the operation of the Kelley cultivator and cultivators built in accordance with the patent claims in suit is further graphically illustrated by a comparison of the assembly instructions of the Kelley Owners Manual (DX 91-73, p. 6) with the assembly instructions of the Lilliston Owners Manual (DX 139-175, p. C). Diagrams from the two manuals are reproduced as Appendix B attached and even a cursory inspection shows the two diagrams to be virtually identical.[18]

Still further evidence of the similarity between the operation of the Kelley cultivator and the cultivators made in accordance with the Lehman patent is to be found elsewhere in the Kelley Owners Manual (DX 91-73 at p. 3) where it is said:

"5. ROW SPIDER GANG ADJUSTMENT

"a. The function of the row gang is to cultivate the soil close to the crop row. Each row gang half can be angled to move soil to the row or away from the row. The spiders should be run as close to the row as possible without harming the crop.

"6. REAR SPIDER GANG ADJUSTMENT

"a. The function of the rear gang is to cultivate the area between crop rows. Gangs can be angled to move soil to the row or away from the row and can be tilted on the pipe to conform to bed shapes.

"7. TYPICAL GANG SETTINGS

"a. The assembly layout drawing shows a typical cultivator setting. Observe that the row gangs are angled to move soil away from the crop row and

[18] It should be noted that the diagram of the Lilliston cultivator in Appendix B is of a later model with a split and staggered row gang rather than the single row gang of the original Lehman cultivator, but the evidence has shown no significant difference between the cultivation results achieved by the two models.

the rear gangs are angled to move soil to the crop row. This particular setting is recommended for larger crops or second cultivation. For small crops or the first cultivation, it is recommended that the row gangs be angled to move soil to the row and the rear gangs angled sufficiently to uproot all weeds as the spiders move soil away from the row."

The deposition testimony of C. J. Whitefield, a mechanical engineer who was formerly Lilliston's senior project engineer and now a Kelley Vice-President, confirms that the Kelley cultivator is claimed by Kelley to do everything the Lilliston machine will do and more.

Q. Did you think the Lilliston rotary cultivator in 1972 was a reasonably effective substitute for a Kelley rotary cultivator?

A. I am sure some Lilliston dealers and customers all felt so, but I would feel ours was a superior machine.

Q. Yours would do everything that the Lilliston machine would do and something more; is that what you are saying?

A. I think that pretty well sums it up. We intended to do more. (Tr. 9, p. 1648)

Finally, defendant's witnesses testified convincingly that the Kelley cultivator and the Lilliston-Lehman machines were functionally equivalent and the motion pictures (DX 30-201) shown by defendant corroborated their testimony.

The conclusion is inescapable that the Kelley cultivator not only contains the same or the functionally equivalent of all the elements disclosed in the '271 reissue patent claims in suit but it is also designed to and does in fact achieve the same once-over, all-over cultivation result as is achieved by cultivators embodying the claims of that patent which are in issue here. *Specialty Equipment & Machinery Corporation* v. *Zell Motor Car Company,* 193 F.2d 515 (4th Cir. 1952). The patent is infringed.

• • •

In addition to the facts found by the court on the issue of infringement the court adopts as its own the following proposed findings of fact and conclusions submitted post-trial by the defendant on this issue: Nos. 7.01-7.08 inclusive: 11.01-11.13 inclusive and 11.16-11.25 inclusive.

The conclusions reached with respect to validity and infringement render moot plaintiff's claim for attorney's fees pursuant to 35 U.S.C. § 285. At this time the court is of the opinion that defendant's motion for attorney's fees should be denied, but this question will be left open until the hearing on the issue of damages at which time evidence may be submitted on the question by both parties.

CONCLUSION

The court's findings of fact and conclusions set forth in this memorandum of decision are summarized as follows:

1. The court has jurisdiction of the parties and subject matter.

2. United States Reissue Patent No. 28,271 is valid and it is infringed by the 400 Series KMC Cultivator manufactured and sold by Kelley Manufacturing Company.

3. Pursuant to Rule 54(b), F.R.Civ.P., the court finds that there is no just reason for delay, and subject to an accounting for the determination of damages due defendant on its counterclaim for infringement final judgment will be entered with respect to the First Claim in the plaintiff's complaint.

/s/ F. T. Dupree, Jr.
F. T. Dupree, Jr.
United States District Judge

June 2, 1978

APPENDIX A —

Objects of the invention

Reissue Patent No. 28,271

An object of this invention is to provide a rotary cultivator having separate gangs of "free-floating" rotary hoes which will engage the row crops with a greater force than heretofore possible with cultivators having conventional free-floating gangs of hoes.

Another object is to provide a rotary cultivator having separate gangs of free-floating rotary hoes which are individually free to conform to the contour of the row each engages.

A further object is to provide a rotary cultivator having separate gangs of free-floating rotary hoes whose ground turning action may be regulated by their angular adjustment with respect to the row crops without a substantial change in their tracking pattern.

Still another object is to provide a rotary cultivator having rotary hoes which will uniformly engage the row crops as well as the ground between the rows regardless of the contour thereof and which will permit the weeds to be pulled from the row crops and covered with dirt turned from between the rows.

A still further object to provide a rotary cultivator of the type above described in which the rotary hoes are mounted with respect to one another in a compact arrangement which, at the same time, enables them to engage the ground with maximum leverage.

Yet another object is to provide such a rotary cultivator which is readily adjustable in a manner to prevent dirt from between the rows being turned onto the crops.

Another object is to provide a cultivator which is readily adjustable for use in cultivating different widths of rows, or even double row crops, as well as in turning a greater or lesser amount of dirt onto the rows.

Still another object is to provide a cultivator in which the cultivating elements thereof are selectively interchangeable with one another to turn dirt from between the rows in either of two directions.

Still a further object is to provide a cultivator having a vehicular frame for supporting the cultivating elements in a manner to permit the force with which such elements engage the ground to be adjusted to a desired amount.

A still further object of this invention is to provide an improved cultivator of the type above described in which the ground intermediate either high or deep planted crops may be turned either toward or away from the crops.

Yet another object is to enable the above-described cultivator to be converted for such use with a minimum of time and expense.

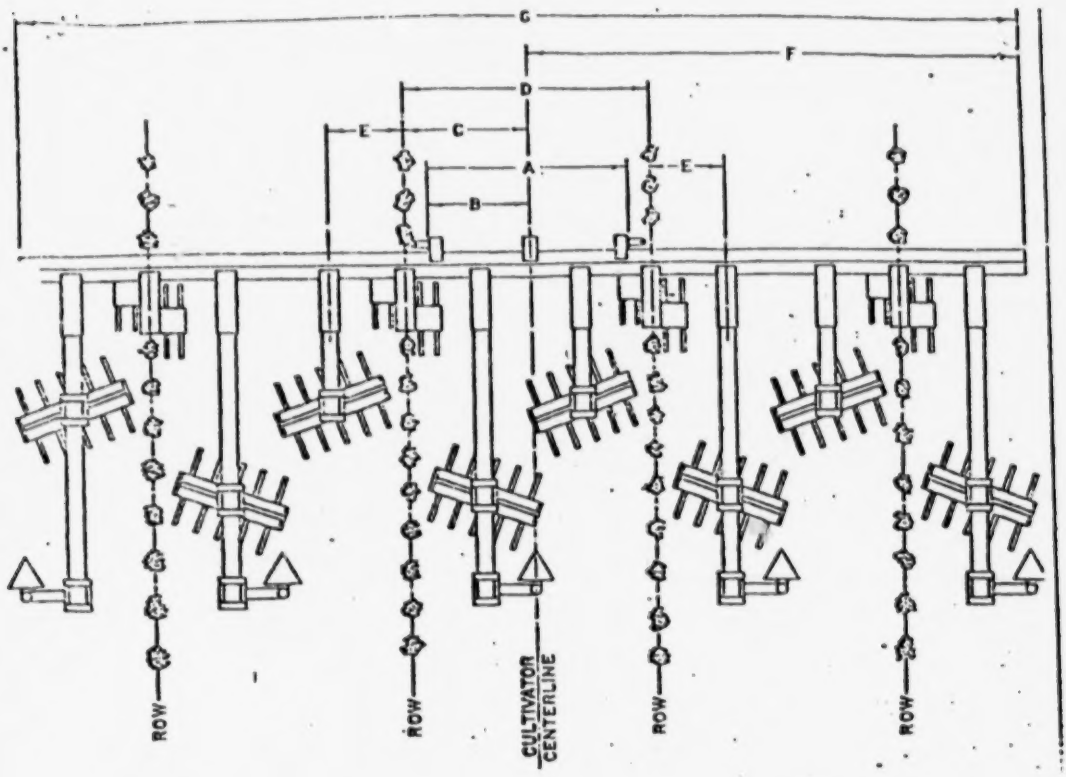
Other objects, advantages and features of this invention will be apparent to one skilled in the art upon a consideration of the written specification, the attached claims and the annexed drawings.

These and other objects are accomplished, in accordance with this invention, by a cultivator which comprises a frame adapted to be moved forwardly over the ground and a plurality of separate gangs which are mounted from the frame for swinging about a transverse axis to rotatably engage spaced-apart rows of crops in a laterally extending row during forward movement of the frame. Each such gang is also swingable about a vertical axis to adjust the angular relation of the path of rotation of the hoes thereof with respect to the rows; and means are carried by the frame for turning the ground intermediate adjacent rows of crops and rearwardly of the engagement therewith of the gangs with the crops.

From the foregoing, it wil be apparent that each gang is free-floating so as to conform to the ground levels of the row crops. It will also be apparent that the an-

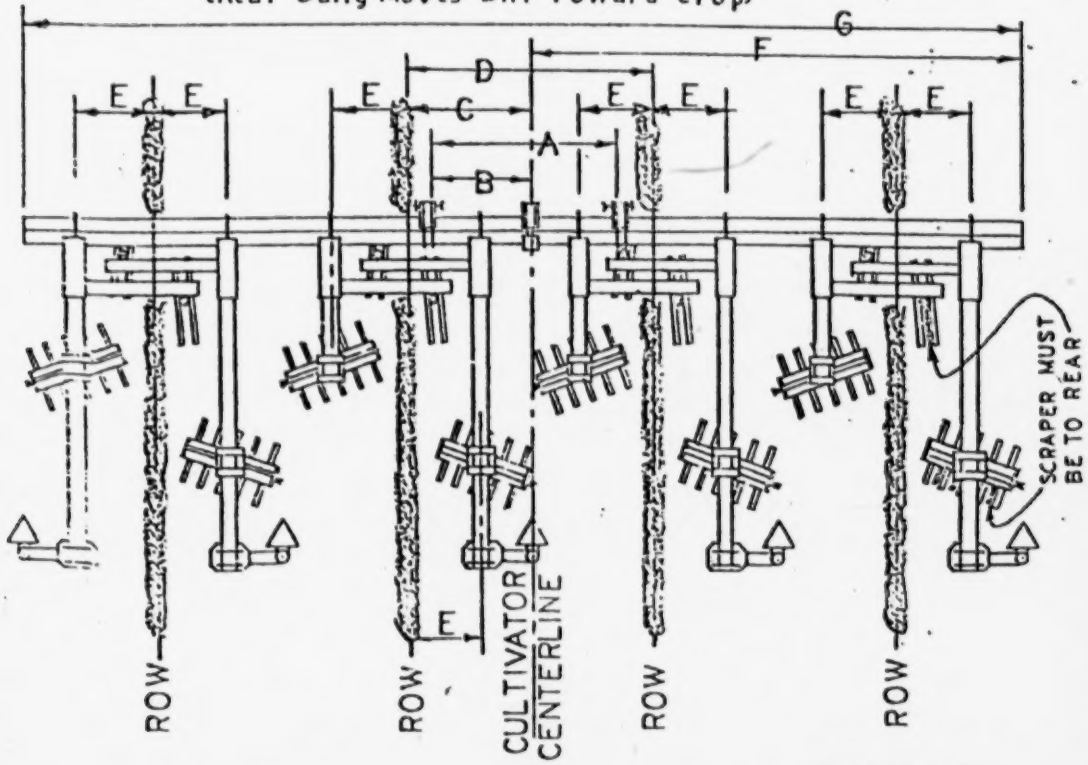
gular adjustment of each gang enables regulation of the extent with which the weeds are chopped out of the crops.

Each separate gang is pivotally mounted from the frame for swinging about an axis rearwardly of the engagement of the hoes of such gang with the ground. In this manner, the hoes engage the ground with a "pushing" action which causes them to penetrate the ground with a greater force than the conventional "pulled" type of hoes. In one form of the invention, the support for each gang of rotary hoes may be pivotally mounted from the frame for swinging about a longitudinal axis so that each gang is free to rock into conformity with the contour of the row it engages.



ASSEMBLY LAYOUT (KELLEY)

For Row Spacings Of 28 Inches And Wider
(Rear Gang Moves Dirt Toward Crop)



APPENDIX B

CIVIL NO. 1295

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NORTH CAROLINA
WILSON DIVISION

KELLEY MANUFACTURING COMPANY,
Plaintiff,

vs.

LILLISTON CORPORATION,
Defendant.

AMENDED JUDGMENT
(Filed June 9, 1978)

This court, having entered a Judgment on June 2, 1978 and now finding it omitted by inadvertence to have provided injunctive relief requested by defendant in its Counterclaim, hereby enters this Amended Judgment.

For the reasons stated in the court's memorandum of decision filed on June 2, 1978, it is now

ORDERED, ADJUDGED AND DECREED:

1. United States Reissue Patent No. 28,271 is valid.

2. United States Reissue Patent No. 28,271 is infringed by the 400 Series KMC Cultivator manufactured and sold by the plaintiff, Kelley Manufacturing Company.

3. Subject to an accounting to determine damages due defendant on its counterclaim for infringement there is no just reason for delay and this is a final judgment with respect to the First Claim in the plaintiff's complaint and defendant's counterclaim for infringement.

4. A writ of injunction issue out of and under the seal of this court, directed to Kelley Manufacturing Company and its officers, agents, servants, employees, attorneys, and persons in active concert or participation with

it, enjoining and restraining them from directly or indirectly in any manner infringing United States Letters Reissue Patent No. 28,271.

5. Jurisdiction is retained for purposes of the accounting and for trial or other disposition of the remaining four claims in plaintiff's complaint.

/s/ F. T. Dupree, Jr.
F. T. Dupree, Jr.
United States District Judge

Dated: June 9, 1978

UNITED STATES COURT OF APPEALS

For The Fourth Circuit

No. 78-1700

UNPUBLISHED

KELLEY MANUFACTURING COMPANY,

Appellant,

vs.

LILLISTON CORPORATION,

Appellee.

Appeal from the United States District Court for the Eastern District of North Carolina, at Wilson.

FRANKLIN T. DUPREE, *District Judge.*

(Argued December 3, 1979—Decided February 28, 1980)

Before BRYAN, *Senior Circuit Judge,* WIDENER and MURNAGHAN, *Circuit Judges.*

James M. Wetzel (John R. Crossan; R.C. Howison, Jr., Henry S. Manning, Jr., Edward S. Finley, Jr., Joyner & Howison on brief) for Appellant; William A. Marshall (Charles J. Merriam, Nate F. Scarpelli, Merriam, Marshall & Bicknell; Edward Taylor Newton, William J. Ormsby, Jr., William H. Needle, Newton, Hopkins & Ormsby; Cyrus F. Lee, Connor, Lee, Connor, Reece & Bunn on brief) for Appellee.

PER CURIAM:

Appellant Kelley Manufacturing Company instituted this suit in the Federal District Court for Eastern North Carolina, seeking a declaration of invalidity, unenforceability and non-infringement of a patent held by appellee Lilliston Corporation on an apparatus employing gangs of rotary hoes for crop-cultivation. The patentee answered maintaining the patent's validity and counterclaiming for infringement by Kelley. After a jury-waived trial, the Court, in its Memorandum Decision of June 2, 1978, upheld the patent and found it to have been infringed by a machine manufactured and sold by Kelley. Kelley now appeals and we affirm.

The facts as found by the District Judge follow. Charles L. Lehman and Alvin H. Lehman were issued patent No. 2,994,387 (the '387 patent) on August 1, 1961 for a machine entitled "Cultivator" on their application of June 12, 1961. It was assigned to Lilliston Corporation later in 1961. During the pendency of this action, Lilliston became aware that the date of the first Lehman application for a patent relating to the cultivator (April 1, 1958) was not mentioned in the final application of June 12, 1961. Thereupon Lilliston applied for a reissue patent, which was granted as reissue No. 28,271 (the '271 patent), dated February 10, 1974 and incorporating April 1, 1958 as the effective date.

The implement to which the patent relates is a machine used for cultivating crops planted in parallel rows. The parties agree that all of the elements found in this machine were "old in the art" at the time of the patent's issue. Thus, the patent is a "combination patent" the validity of which depends on the inventiveness of the arrangement and adjustment of the old elements. The Kelley Manufacturing Co. began selling its allegedly infringing product in September, 1971.

We see the record as fully supporting the District Court's declaration that the Lilliston patent is valid and its rejection of Kelley's assertions, based on prior sale,

anticipation and obviousness[1], that the patent should not stand. Likewise, we find adequate evidence to justify the District Court's conclusion that, despite some differences in their structures, the crucial elements of the two cultivators are "substantially and functionally equivalent," and that the Kelley cultivator infringes on Lilliston's patent. We therefore affirm the lower court's disposition of both of these issues on the basis of its opinion. *Kelley Manufacturing Co.* v. *Lilliston Corp.*, No. 1295 Civ. (E.D.N.C. June 2, 1978).

Kelley argues strenuously that the District Court failed to address its defense of "intervening rights." Kelley claims that, when it began selling its cultivator in 1971, it did so in "the good faith belief" that it would not be liable for infringement. This belief rested on Kelley's awareness that the technical defect in Lilliston's '387 patent, its failure to adopt the earliest application date, could render the patent invalid because of a sale of the patented machine more than a year before the '387 patent's effective date. The subsequent reissuance of the patent to correct that defect, Kelley contends, should not subject Kelley to liability for the previous marketing of the infringing machine.

A court, in its discretion, may recognize the "intervening rights" of an infringer under the traditional equitable doctrine now codified in Section 252 of Title 35 of the United States Code. The District Court apparently declined to do so here, and we find ample support in the record for this result. Kelley's admitted desire to take advantage of an easily remediable technical error in the

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[1] Kelley correctly points out in this appeal that the District Court's opinion erroneously states that Kelley failed to ask its own expert witness whether the patent would have been obvious to him prior to 1958. A question to that effect was posed and Dr. Clark responded affirmatively. Transcript at 123-24. In view of the ample evidence supporting the Court's finding of nonobviousness, however, this inaccuracy does not undermine the Court's holding.

Lilliston patent cannot be equated with the situation the doctrine obviously contemplates—infringement resulting from good faith reliance on the claims asserted in an earlier patent. *See, e.g., Wayne-Gossard Corp.* v. *Moretz Hosiery Mills, Inc.*, 539 F.2d 986, 989-91 (4th Cir. 1976). *Cf. Grant* v. *Raymond*, 31 U.S. 218, 243-44 (1832) Marshall, C.J.) (discussing policies favoring recognition of priority of reissued patents). At any rate, the doctrine has no application where the crucial claims of the reissued patent are substantially identical to those of the original patent, 35 U.S.C. § 252, as is indeed the case here.[2] Therefore, in affirming the decision of the District Court, we also affirm that court's refusal to confer upon Kelley the benefit of the intervening rights defense.

In fine, the District Judge's Memorandum Decision and his other rulings are comprehensive, exhaustive and sound, and adopting them we render a judgment of affirmance. *Kelley Manufacturing Co.* v. *Lilliston Corp.*, No. 1295 Civ. (E.D.N.C. June 2, 1978).

Affirmed

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[2] Kelley contends that the change in priority date constitutes the requisite change in the claims of the patent to justify its assertion of intervening rights. Although Section 252 could come into play to protect "[t]he equitable interests of any party who might have been misled by a lack of notice of the . . . priority date" later established in the reissued patent, *Fontyn* [sic] v. *Okamoto*, 518 F.2d 610, 623 (C.C.P.A. 1975), the circumstances of this case do not call for the invocation of the doctrine.

UNITED STATES COURT OF APPEALS

FOR THE FOURTH CIRCUIT

No. 78-1700

KELLEY MANUFACTURING COMPANY,

Appellant,

vs.

LILLISTON CORPORATION,

Appellee.

ORDER

(Filed April 28, 1980)

Upon consideration of the appellant's petition for rehearing, by counsel,

IT IS ORDERED that the petition for rehearing is DENIED.

Entered at the direction of Judge Bryan, for a panel consisting of Judge Bryan, Judge Widener, and Judge Murnaghan.

For the Court,

/s/ William K. Slate, II
Clerk

AUTHORITIES CITED

THE CONSTITUTIONAL PROVISION

Art. 1, Sec. 8. The Congress shall have power . . . To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.

STATUTES

TITLE 35, UNITED STATES CODE

§ 102. Conditions for patentability; novelty and loss of right to patent

A person shall be entitled to a patent unless—

. . .

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or . . . .

§ 103. Conditions for patentability; non-obvious subject matter

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

§ 120. Benefit of earlier filing date in the United States

An application for patent for an invention disclosed in the manner provided by the first paragraph of section 112 of this title in an application previously filed in the United States, or as provided by section 363 of this title, by the same inventor shall have the same effect, as to such invention, as though filed on the date of the prior application, if filed before the patenting or abandonment of or termination of proceedings on the first application or on an application similarly entitled to the benefit of the filing date of the first application and if it contains or is amended to contain a specific reference to the earlier filed application.

§ 251. Reissue of defective patents

Whenever any patent is, through error without any deceptive intention, deemed wholly or partly inoperative or invalid, by reason of a defective specification or drawing, or by reason of the patentee claiming more or less than he had a right to claim in the patent, the Commissioner shall, on the surrender of such patent and the payment of the fee required by law, reissue the patent for the invention disclosed in the original patent, and in accordance with a new and amended application, for the unexpired part of the term of the original patent. No new matter shall be introduced into the application for reissue.

The Commissioner may issue several reissued patents for distinct and separate parts of the thing patented, upon demand of the application, and upon payment of the required fee for a reissue for each of such reissued patents.

The provisions of this title relating to applications for patent shall be applicable to applications for reissue of a patent, except that application for reissue may be made and sworn to by the assignee of the entire interest if the application does not seek to enlarge the scope of the claims of the original patent.

No reissued patent shall be granted enlarging the scope of the claims of the original patent unless applied for within two years from the grant of the original patent.

§ 252. Effect of reissue

The surrender of the original patent shall take effect upon the issue of the reissued patent, and every reissued patent shall have the same effect and operation in law, on the trial of actions for causes thereafter arising, as if the same had been originally granted in such amended form, but in so far as the claims of the original and reissued patents are identical, such surrender shall not affect any action then pending nor abate any cause of action then existing, and the reissued patent, to the extent

that its claims are identical with the original patent, shall constitute a continuation thereof and have effect continuously from the date of the original patent.

No reissued patent shall abridge or affect the right of any person or his successors in business who made, purchased or used prior to the grant of a reissue anything patented by the reissued patent, to continue the use of, or to sell to others to be used or sold, the specific thing so made, purchased or used, unless the making, using or selling of such thing infringes a valid claim of the reissued patent which was in the original patent. The court before which such matter is in question may provide for the continued manufacture, use or sale of the thing made, purchased or used as specified, or for the manufacture, use or sale of which substantial preparation was made before the grant of the reissue, and it may also provide for the continued practice of any process patented by the reissue, practiced, or for the practice of which substantial preparation was made, prior to the grant of the reissue, to the extent and under such terms as the court deems equitable for the protection of investments made or business commenced before the grant of the reissue.

§ 254. Certificate of correction of Patent and Trademark Office mistake

Whenever a mistake in a patent, incurred through the fault of the Patent and Trademark Office, is clearly disclosed by the records of the Office, the Commissioner may issue a certificate of correction stating the fact and nature of such mistake, under seal, without charge, to be recorded in the records of patents. A printed copy thereof shall be attached to each printed copy of the patent, and such certificate shall be considered as part of the original patent. Every such patent, together with such certificate, shall have the same effect and operation in law on the trial of actions for causes thereafter arising as if the same had been originally issued in such corrected form. The Commissioner may issue a corrected patent without charge in lieu of and with like effect as a certificate of correction.

RULES

TITLE 37 — CODE OF FEDERAL REGULATIONS

§ 1.175 Reissue oath or declaration.

(a) Applicants for reissue, in addition to complying with the requirements of the first sentence of § 1.65, must also file with their applications a statement under oath or declaration as follows:

(1) When the applicant verily believes the original patent to be wholly or partly inoperative or invalid, stating such belief and the reasons why.

(2) When it is claimed that such patent is so inoperative or invalid "by reason of a defective specification or drawing," particularly specifying such defects.

(3) When it is claimed that such patent is inoperative or invalid "by reason of the patentee claiming more or less than he had a right to claim in the patent," distinctly specifying the excess or insufficiency in the claims.

(4) When the applicant is aware of prior art or other information relevant to patentability, not previously considered by the Office, which might cause the examiner to deem the original patent wholly or partly inoperative or invalid, particularly specifying such prior art or other information and requesting that if the examiner so deems, the applicant be permitted to amend the patent and be granted a reissue patent.

(5) Particularly specifying the errors or what might be deemed to be errors relied upon, and how they arose or occurred.

(6) Stating that said errors, if any, arose "without any deceptive intention" on the part of the applicant.

(b) Corroborating affidavits or declarations of others may be filed and the examiner may, in any case, require additional information or affidavits or declarations concerning the application for reissue and its object.

IN THE UNITED STATES PATENT OFFICE

IN RE: Patent No. 2,994,387

GRANTED: August 1, 1961

TO: Charles L. Lehman
and
Alvin H. Lehman

FOR: CULTIVATOR

On Petition for Certificate of Correction

The petition under 35 U.S.C. 254 and Rule 322, filed with the Solicitor on May 23, 1973, has been carefully considered. However, no certificate of the character sought is warranted.

By examiner's amendment dated June 15, 1961, characterization of application S.N. 113,993 (upon which the captioned patent was granted) as a "continuation" of prior applications S.N. 800,304 and 54,468 was changed to "continuation-in-part" thereof. No error is seen in that change, since S.N. 113,993 consolidated the disclosures of the other two and therefore clearly added matter to each taken individually. As defined in §201.08 of M.P.E.P.

> "A continuation-in-part is an application filed during the lifetime of an earlier application by the same applicant, repeating some substantial portion or all of the earlier application *and adding matter not disclosed* in said earlier case."

Since the disclosure presented in a "continuation" must be the same as that of its patent, it would have been misleading to permit characterization of the patent as a "continuation" of either S.N. 800,304 and 54,468. It is noted that the applicants tacitly acceded to the examiner's change, since no countermanding Rule 312 amendment was filed as suggested in the examiner's amendment where "changes are not satisfactory to the applicant." Also,

the particular labeling of an application as a "continuation" or "continuation-in-part" of an earlier application should not be a matter of dire consequence, particularly since those terms do not appear in 35 U.S.C. 120. To secure whatever benefit petitioner is entitled to under §120, where applications S.N. 800,304 and 54,468 are concerned, it would seem sufficient that the patent merely make "specific reference" thereto.

Petitioner recognizes that additions of specific references to the yet earlier applications S.N. 725,640 and 725,641 may be sought by reissue. *Sticker Industrial Supply Corp.* v. *Blaw-Knox Company et al.,* 167 USPQ 442 (DC N.D. Ill., 1970). However, the argument is advanced that the omission of such references in S.N. 113,993 could be likened to a *trivial clerical error,* and hence subject to correction by certificate under 35 U.S.C. 254. *Brenner* v. *The State of Israel,* 158 USPQ 584 (CA DC, 1968) is cited in support of that characterization. While correction by certificate of correction would certainly simplify matters for petitioner and the Patent Office, consideration due others militates against that resolution.

In the *State of Israel* case, the rights of third parties were acknowledged, the court opining that "We think that it is altogether possible that Section 252 can be read broadly enough to protect a deserving third party in this kind of situation" (158 USPQ 586). On the other hand, third parties could not assert any comparable statutory intervening right if correction were obtained by certificate of correction.

Petitioner faults the examiner for not suggesting that reference be made in S.N. 113,993 to S.N. 725,640 and 725,641. However, petitioner will recall that the latter were referred to in S.N. 800,304, and that S.N. 113,993 in turn referred to S.N. 800,304. Also, patent No. 2,994,387 was granted prior to the published decision in *Holvid* v. *Asari,* 134 USPQ 162 (CA 9, 1962). Consequently, there was no apparent need to suggest that petitioner speci-

fically refer to S.N. 725,640 and 725,641 in S.N. 113,993. The examiner may not have been clairvoyant, but cannot reasonably be faulted on that account.

/s/ Jere W. Sears
Jere W. Sears
Associate Solicitor

July 10, 1973

[counsel's address omitted]

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No. 80-141

IN THE

Supreme Court of the United States

OCTOBER TERM, 1979

KELLEY MANUFACTURING COMPANY,
Petitioner,

vs.

LILLISTON CORPORATION,
Respondent.

ON PETITION FOR A WRIT OF CERTIORARI TO
THE UNITED STATES COURT OF APPEALS
FOR THE FOURTH CIRCUIT

BRIEF FOR LILLISTON CORPORATION IN OPPOSITION

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QUESTIONS PRESENTED.

Questions 1 and 2 posed by petitioner incorrectly state the "original patent was invalid". There was no finding or adjudication by the District Court or the Court of Appeals that the original patent was invalid.

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LILLISTON CORPORATION,

Respondent.

ON PETITION FOR A WRIT OF CERTIORARI TO
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FOR THE FOURTH CIRCUIT

BRIEF FOR LILLISTON CORPORATION IN OPPOSITION

Respondent respectfully requests that the Petition for a Writ of Certiorari for review of the judgment of the United States Court of Appeals for the Fourth Circuit in this case be denied.

OPINIONS BELOW.

The entire District Court opinion is reproduced in the Appendix (Res. App.), infra at A1. This independent reproduction by respondent was necessitated by the failure of petitioner to include the complete opinion.

STATUTES INVOLVED.

The statutes involved are reproduced in the Petition Appendix (Pet. App. A38-40).

STATEMENT OF THE CASE.

Petitioner's recitation of "The Suit and Issues Below" is the only adequate presentation in this section. The remaining sections are flagrantly inaccurate and misleading.

In "The Subject Matter of the Patent In Suit" and in "The Prior Art" petitioner omits any reference to the Lehman patent claims defining the row gang as being angularly adjustable, an essential feature of the claimed combination. The illustration at page 5 of the petition is not from the record—it is a hypothetical combination concocted by petitioner and should have been so identified.* In the section entitled "The Prior Sale Invalidity and Reissuance" petitioner inaccurately recites "so the original '387 patent was invalid as stated" without citing any such conclusion in the record. The rest of petitioner's "STATEMENT OF THE CASE" is a rehash of arguments presented and rejected in the courts below. Respondent is thus required to present its own Statement.

The Subject Matter of the Patent in Suit.

The invention defined by the Lehman, et al., patent claims was correctly stated by the District Court in its opinion (Res. App. A5-A6):

> "a gang of rotary hoes directly over the crop row but angled so as to displace the soil laterally instead of following the row straight on as had previous rotary hoe arrangements. This angled gang (called the 'row gang') was followed by two gangs of rotary hoes, one on each side of the row (called 'rear gangs') each of which was equipped with

* The alleged row gang of the "hypothetical combination" is not capable of being angularly adjustable.

means to angle it so as to allow soil to be thrown toward or away from the row.

* * *

"Surprisingly, when this arrangement of angularly-adjustable, free-floating rotary hoes was run over a row of crops it was found that the soil could be cultivated across the top of the row between the plants as well as alongside them, whereas the more conventional arrangements had permitted cultivation only alongside the plants leaving an uncultivated strip along the top of the row. Moreover, it was found that damage to the crops themselves was far less than anticipated, and was in fact quite acceptable. Since this happy result eliminated much of the hand hoeing which had previously been necessary where conventional cultivators were used, it came to be called 'once-over, all-over' cultivation." (footnote omitted)

In Lilliston Implement Company v. *E. L. Caldwell & Sons, Inc.*, 212 F. Supp. 413 (S. D. Tex. 1962) the original patent in suit was held to be valid and infringed, Judge Garza stating:

"The patentees of the patent in suit were seeking a patent on a cultivator for 'once-over all-over' cultivation which allowed a row of growing crops to be cultivated without the destruction of the same, as well as cultivating the ground on either side of the growing row of crops, which would allow dirt to be thrown on the crops or away from them. This is what they were seeking a patent on as a novel invention, and that is what they obtained from the Patent Office." 212 F. Supp., at 418.

* * *

"The cultivator patented by the Lehmans is one that has revolutionized the cultivation of growing crops." 212 F. Supp., at 419.

The Prior Art.

Prior to trial, petitioner cited over 300 references, but at trial principally relied on twelve patents. (Res. App. A7). As to petitioner's now "prominent patent art" examples, Maul

shows a cultivator having two gangs of free-floating "spading teeth" designed to run on opposite sides of a row of crops. (Res. App. A10). Braun shows a conventional straight row gang, atop the crop row, with no means for angularly adjusting the row gang. Braun does not teach the "once-over all-over" concept achieved by the patent in suit. (Res. App. A55).

In concluding the differences between the cited prior art and the claims in issue, the District Court found:

> ". . . the fact that in no prior cultivator had there been an arrangement of a row gang of rotary hoes and two rear gangs of rotary hoes, each separately mounted and free-floating and each angularly adjustable so as to permit 'rotatable engagement' of the row of crops with maximum destruction of weeds and grasses and minimal damage to the crops themselves." (Res. App. A10).

The Original Patent and Reissuance.

The Lehmans filed two applications for patents on April 1, 1958. On March 18, 1959, they next filed a third application combining the two prior applications and adding new matter. On September 7, 1960, a fourth application was filed and on June 12, 1961 the final application was filed combining the 1959 and 1960 applications which matured into the original patent in suit, No. 2,994,387, issued August 1, 1961. (Res. App. A6 and A33).

Each application contained a specific reference to the immediately preceding application(s), identifying the prior application by serial number and filing date to obtain the benefit of the earliest application's filing date pursuant to 35 U. S. C. § 120. This procedure met the conventional practice and interpretation of the law then in effect prior to 1962 to give the original patent the April 1, 1958 effective filing date of the earliest applications.

Since 1962, some courts have interpreted 35 U. S. C. § 120 and Rule 78 of the U. S. Patent Office Rules of Practice there-

under to mean that the final application maturing into a patent must specifically refer to the earliest application of which benefit of the filing date is sought. *Kelley Mfg. Co.* v. *Lilliston Corp.*, 180 U. S. P. Q. 364, 367 (E. D. N. C. 1973). Prior to trial in this action, a reissue was sought and obtained to specifically incorporate the April 1, 1958, filing date of the earliest application in view of this apparently changed law. The only effect of the reissuance was to confirm for the original patent the earlier effective date. (Res. App. A7 and A34).

The Rulings Below

The action below was a factual controversy. In addition to the findings set forth in the trial Court's Memorandum Decision, that Court adopted as its own, additional specific findings. (Res. App. A16 and A25). Upon thorough review, the Court of Appeals held:

> ". . . the District Judge's Memorandum Decision and his other rulings are comprehensive, exhaustive and sound, and adopting them we render a judgment of affirmance."

A. On Intervening Rights.

The Court of Appeals affirmed the trial Court in its rulings: (1) petitioner had no intervening rights where the reissue claims are substantially identical to the original claims, pursuant to 35 U. S. C. § 252, paragraph 2, first sentence; and (2) the factual situation and circumstances of this case obviated any application of the equitable doctrine of intervening rights.

The trial Court found the original patent had an effective filing date of April 1, 1958 (Res. App. A7 and A34), and that the patented invention was not on sale or in public use more than one year prior to the effective filing date of the original patent. (Res. App. A58). Contrary to petitioner's statement, the trial Court did not find that the original patent was invalid

or that the patented invention was on sale prior to March 18, 1958.

The Court of Appeals specifically ruled:

> ". . . the doctrine [of intervening rights] has no application where the crucial claims of the reissue patent are substantially identical to those of the original patent, 35 U. S. C. Section 252, as is indeed the case here." (Pet. App. A36).

The Court of Appeals also found "ample support in the record" to deny petitioner intervening rights "under the traditional equitable doctrine now codified in Section 252 . . . ." (Pet. App. A35).

B. On Validity.

The Court of Appeals found "the record as fully supporting" the trial Court's rulings on patent validity, rejecting petitioner's assertions "based on prior sale, anticipation and obviousness." (Pet. App. A34-A35).*

The trial Court correctly applied the 35 U. S. C. § 103 obviousness test enunciated by this Court in *Graham* v. *John Deere and Co.*, 383 U. S. 1, 17 (1966). In its opinion, Section 103 is recited and each of the required considerations is thoroughly examined. (Resp. App. A9 to A16). Further findings which the trial Court adopted on validity are set forth in the Appendix herein at A50 to A56.

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* Petitioner has not challenged the holding of infringement by the Courts below.

ARGUMENT.

A. Introduction

The issues presented by petitioner for review are *not* "special and important reasons" for granting the petition. Essentially, petitioner seeks a *factual* review which is not provided for by Supreme Court Rule 17.

B. There Is No Need to Review the Intervening Rights Portions of the Reissue Patent Sections of the Patent Laws.

The fact that this Court has *not* reviewed the intervening rights portions of the reissue patent sections since 1940 is manifest evidence of the clarity of the statutory language and the lack of any need to affirm what the statutory language clearly provides.

In any event, the basis asserted by petitioner for the need for review is misrepresented. Contrary to petitioner's characterization, the patent in suit has *never* been declared invalid nor has it *ever* been determined that there had been a prior sale or public use of the invention which would invalidate the patent.

Thus, even if petitioner's argument had any substance (which it does not) it is not applicable here because the activities of petitioner have been found to infringe "a valid claim of the reissued patent which was in the original patent". In this circumstance, the reissue statute, 35 U. S. C. § 252, is unequivocal and petitioner has *no* intervening rights.

C. The Courts in Adjudicating the Patent-In-Suit Did Follow the Policy of Strict Statutory Construction.

At least implicitly, petitioner admits that the reissue statutes are "plainly written." However, the argument that the trial Court ignored the pleaded protection of intervening rights and that the Appeals Court "misread" the plain language of the

statute does not provide "special and important reasons" for the granting of the petition. Petitioner seeks a factual review to which it is not entitled.

D. There Is No Conflict of Authorities in Cases Where the Issue Is a Claim to Priority Changed in a Reissue Application.

A reading of the cases* cited by petitioner (Pet. 13, 14) will show there is no conflict in the application of the reissue sections of the Patent Laws in cases where a patent has been reissued to change a claim to priority of invention. The Courts are unanimous in holding that a patent can be reissued to claim an earlier priority of invention. In each case cited, even those in which the reissue did not involve a change in claim of priority, a *factual* determination was made and the provisions of the statute properly applied as the case may be. Any *obiter dicta* remarks of the respective Courts are irrelevant.

There is, however, *no* conflict with the only case in point in connection with petitioner's argument, viz, *St. Regis Paper Company* v. *Bemis Company, Inc.*, 403 F. Supp. 776 (S. D. Ill. 1975), rev'd. on other grds., 549 F. 2d 833 (7th Cir. 1977), cert. den. 434 U. S. 833. That case "squarely held", at 793 that where a patent has been reissued *solely* to claim an earlier priority date, and thereby merely to correct a technical defect in cross-referencing hereditary applications brought on by a possible change in the law, *no* intervening rights arise under the reissue statute.

E. There Is No Conflict with Graham v. Deere.

This attempt at a "make weight" argument has no substance. No trial Court could more thoroughly apply the *Graham* v. *Deere* standards to the facts than the trial Court did in this case.

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* Several of the cases cited by petitioner do not even involve this principle of law.

CONCLUSION.

The petition should be denied out of hand.

Respectfully submitted,

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APPENDIX

IN THE UNITED STATES DISTRICT COURT
For the Eastern District of North Carolina
Wilson Division

Kelley Manufacturing Company,
Plaintiff,
vs.
Lilliston Corporation,
Defendant.
Civil No. 1295

MEMORANDUM OF DECISION

Following dismissal of an action for patent infringement brought by Lilliston Corporation (Lilliston), a Georgia corporation, against Kelley Manufacturing Company (Kelley), another Georgia corporation, in the Southern District of Texas on improper venue grounds Kelley instituted this declaratory judgment action in the Eastern District of North Carolina where Lilliston maintains a warehouse and conducts some business. The First Claim of plaintiff's complaint was severed for trial purposes and has been tried to the court without a jury on the issues of validity, enforceability and infringement of a patent held by Lilliston for a farm cultivator.[1] In this memorandum of decision the court will record its findings of fact and conclusions of law as required by Rule 52(a), F. R. Civ. P. Jurisdiction is based on 28 U. S. C. §§ 1338 and 2201.

1. Kelley's Second and Third Claims allege violations by Lilliston of the antitrust laws; the Fourth Claim alleges violations of the unfair competition laws of North Carolina and Georgia; and the Fifth Claim charges Lilliston with infringement of a peanut harvesting machine. These claims have been reserved for trial at a later date.

The patent in suit is United States Reissue Patent No. 28,271 (the '271 Reissue Patent) entitled "Cultivator" which issued originally as United States Patent No. 2,994,387 (the '387 Patent) on August 1, 1961 to Charles L. and Alvin H. Lehman and by them assigned to Lilliston in 1961. Plaintiff's complaint which originally attacked the validity of the '387 patent was amended following its reissue on December 10, 1974, but the complaint as amended did not essentially depart from the typically all-incllusive allegations usually found in patent litigation, that is to say, it alleged that the reissue patent is invalid, void and unenforceable because of the prior use, sale and disclosure of the patented invention; anticipation by the prior art; obviousness in view of the prior art; abandonment; file wrapper estoppel; new matter; failure to obtain a license to file foreign applications; failure to clearly disclose, define or distinctly claim the invention; failure to set forth the best mode contemplated by the inventors for carrying out the invention; claiming aggregations of parts of elements; inoperative disclosure, incapable of accomplishing the intended purpose; inutility; indefinite and overbroad claims; bad faith; intentional and material representations to the Patent Office and estoppel by reason of the same; patent misuse; and violation of the antitrust laws.

In an amended answer defendant denied all of plaintiff's allegations and in a counterclaim alleged infringement by plaintiff of Claims Eight, Ten—Thirteen and Twenty—Twenty-Four inclusive of the '271 reissue patent. Relief sought by the defendant on its counterclaim includes a permanent injunction against infringement of the patent by Kelley; damages for past infringement; punitive and treble damages because of the alleged willful and deliberate nature of Kelley's infringement; and costs and attorney's fees.

The patent in suit relates to an apparatus for cultivating crops planted in parallel rows, and the general objective of the invention is

". . . To provide a rotary cultivator having separate gangs of 'free-floating' rotary hoes which will engage the row crops with a greater force than heretofore possible with cultivators having conventional free-floating gangs of hoes."

After listing some ten or more additional objects of the invention (see Appendix A attached hereto) the patent states that

"These and other objects are accomplished in accordance with this invention, by a cultivator which comprises a frame adapted to be moved forwardly over the ground and a plurality of separate gangs which are mounted from the frame for swinging about a transverse axis to rotatably engage spaced-apart rows of crops in a laterally extending row during forward movement of the frame. Each such gang is also swingable about a vertical axis to adjust the angular relation of the path of rotation of the hoes thereof with respect to the rows; and means are carried by the frame for turning the ground intermediate adjacent rows of crops and rearwardly of the engagement therewith of the gangs with the crops."

Typical of the claims in suit is Claim Twenty which reads:

"20. A cultivator, comprising a frame adapted to be moved forwardly over the ground, a gang of rotary hoes mounted on the frame for swinging about a transverse axis to rotatably engage a row of crops during forward movement of the frame, a pair of additional gangs of rotary hoes each mounted from the frame for swinging about a transverse axis to rotatably engage the ground on each opposite side of the row of crops and rearwardly of the engagement of the hoes of the first-mentioned gang therewith during forward movement of the frame, and means for adjusting the angular relation of the path of the rotation of the hoes of each gang with respect to the forward movement of the frame."

A rotary hoe in farm machinery parlance can be likened to a metal wheel (usually about ten to fifteen inches in diameter) from which the rim has been removed leaving the spokes to engage and till the soil as the rotary hoe moves over the ground.

The name probably derives from the fact that in earlier models the ends of the spokes were shaped like small hoes which enabled them to engage the ground with a digging action. In more recent versions the spokes have been arcuate in form and their leading edges have been sharpened so that they engage the ground with a slicing action. These are called "slicer tines", but they still fit within the generic term of rotary hoe.[2]

When more than one rotary hoe is mounted on the same axle it is called a "gang of rotary hoes."

Since the parties agree that all of the elements required by the patent in suit were old in the art at the time of its original issue, we are concerned here with a combination patent, and the principal issue on the question of validity is whether or not the manner in which the Lehman brothers arranged these elements and provided for their adjustment constituted patentable invention. The problems which the inventors were seeking to solve were stated in the opening paragraphs of the patent as follows:

> "In a conventional rotary cultivator, rotary hoes are fixedly secured across the width of a frame in multiple rows so that, as the frame is moved forwardly, the ends of the legs of each hoe successively penetrate the ground to break up its upper crust. If, however, the ground is not level, the crops from the high rows may be pulled up due to the concentrated weight of the hoes imposed upon them, while the low rows may not even be touched by the hoes. Still further difficulty is encountered when the crops to be cultivated are planted either high on a row or deep in a row.
>
> "Ordinarily, weeds are rooted only in the surface crust of the ground above the more deep-rooted crops such that they may be pulled up by the rotary hoes without damage to the crops themselves. When the crops are high, it is desirable to kill off the chopped weeds by covering them

2. Jack C. Whitesides, formerly a design engineer of Lilliston and now a Kelley Vice-President, holds U. S. Patent No. 3,232,356 which covers a slicer tine tool, but the title of the patent is "Rotary Hoe".

with dirt from between the rows. It may also be desirable to build up the row in order to facilitate operation of a mechanical picker or the like. On the other hand, when the crops are low, caution should be taken to see that they are not covered by dirt from between the rows."

To solve these problems the inventors experimented with running a gang of rotary hoes directly over the crop row but angled so as to displace the soil laterally instead of following the row straight on as had previous rotary hoe arrangements. This angled gang (called the "row gang") was followed by two gangs of rotary hoes, one on each side of the row (called "rear gangs") each of which was equipped with means to angle it so as to allow soil to be thrown toward or away from the row. In addition to being thus pivotable about a vertical axis the row gang and the rear gangs were each individually mounted to pivot about a transverse axis which enabled them to be "free-floating" and thus to follow more closely the contour of the row being cultivated. Finally, means were provided for tilting the gangs with respect to the vertical plane.[3] This triangular arrangement of the rotary hoes could, of course, be repeated several times on one supporting frame thus allowing several rows to be cultivated at once.

Surprisingly, when this arrangement of angularly-adjustable, free-floating rotary hoes was run over a row of crops it was found that the soil could be cultivated across the top of the row between the plants as well as alongside them, whereas the more conventional arrangements had permitted cultivation only alongside the plants leaving an uncultivated strip along the top

3. Also stressed in the description of the invention was the feature of pivotally mounting the gangs from the frame "for swinging about an axis rearwardly of the engagement of the hoes of such gang with the ground." This arrangement, it was asserted, enabled the hoes to engage the ground with a "pushing" action which resulted in penetration of the ground with "a greater force than the conventional 'pulled' type of hoes." Witnesses at the trial did not ascribe any particular virtue to this feature.

of the row. Moreover, it was found that damage to the crops themselves was far less than anticipated, and was in fact quite acceptable. Since this happy result eliminated much of the hand hoeing which had previously been necessary where conventional cultivators were used, it came to be called "once-over, all-over" cultivation.[4]

VALIDITY

Of the multiple charges of invalidity mounted by plaintiff against the '371 reissue patent the court deems the following worthy of discussion:

1. *Prior Use, Sale and Disclosure.*

The Lehmans began work on their invention as early as 1956, and they filed two applications for patents on April 1, 1958. They next filed a continuation-in-part application on March 18, 1959, which included the subject matter of the two prior applications and introduced new matter. On September 7, 1960 a fourth application was filed, and on June 12, 1961 the final application was filed which combined the 1959 and 1960 applications into a single application which matured into the original patent in suit, No. 2,994,387.

The Lehmans sold a cultivator embodying features covered by this patent to a Mr. Eugene Engels "around the first of March" of 1958. Thus it may very well be that there was a sale of the patented invention more than one year prior to March 18, 1959, the date of the first application referred to in the '387 patent. If so, the patent would be invalid under 35 U. S. C. § 102(b).[5] During the pendency of this action, however, Lilliston

---

4. The term is not used in the patent itself, but the words "once-over" were used in the course of the prosecution of the patent and appear at pages 51 *et seq.* of the file wrapper.

5. The matter is discussed in more detail in *Kelley* v. *Lilliston*, ... F. Supp. ....., 180 USPQ 364 (E. D. N. C. 1973), in which

(Footnote continued on next page.)

applied for and obtained reissuance of the '387 patent as the '271 reissue patent in order to incorporate the filing date of the first Lehman application, that is, April 1, 1958.[6] Since the only evidence of a prior use, sale or disclosure showed it to have been well within one year prior to April 1, 1958, the prior sale charge has not been sustained.

2. *Anticipation by the Prior Art.*

In an infringement suit brought by Lilliston in the Southern District of Texas shortly after the issuance of the '387 patent Judge Reynaldo Garza held the patent valid and in the course of his opinion wrote:

> "There is no question that the patent in suit involves an invention which has been made in a very highly developed and crowded field. The defendant cited more than 80 prior art patents and publications, but at the trial relied mainly upon the Bonds Patent No. 1,249,008, issued in 1917." *Lilliston Implement Company* v. *E. L. Caldwell & Sons, Inc.*, 212 F. Supp. 413, 419 (S. D. Tex. 1962).

While conceding that no claim of the patent in suit is fully anticipated by any single prior art cultivator, the plaintiff here has cited over 300 references against the patent and has strongly maintained that when the claims are given the "broad interpretation" contended for by Lilliston they "read on" one or more prior art cultivators. Of the many references cited plaintiff places principal reliance on these twelve patents:

Braun 1,908,110 (PX 10-91)
Remy French 1,104,111 (PX 12-115 and PX 13-116)

(Footnote continued from preceding page.)
this court denied plaintiff's motion for summary judgment based on nine separate grounds which included the "on-sale" charge.

6. In accordance with procedure then in effect this earliest date had not been brought forward in the prosecution as a continuation-in-part of the '387 patent. The only effect of the reissuance was to give the '387 patent the earlier effective date.

Walker 2,227,772 (PX 27-112)
Burns 2,243,241 (PX 55-233)
Ogden 675,968 (PX 11-87)
Maul 529,457 (PX 14-143)
Charley 2,655,083 (PX 41-326)
Newton 1,681,464 (PX 39-325)
Friend 2,579,561 (PX 40-324)
Benjamin 1,760,336 (PX 33-95)
Christensen, et al. 1,043,202 (PX 49-140)
Christofferson 949,218 (PX 48-89)

An examination of these patents reveals that while they all contain one or more of the elements which admittedly were old in the art in 1958 (discs, rotary hoes, scratcher teeth, shovels, sweeps, etc.) and means to angle, tilt and "free-float" them, none of them discloses the triangular arrangement of angularly-adjustable, free-floating rotary hoes of the Lehman patent designed to run over a row of crops and cultivate the soil around and adjacent to the plants.

> "It is suggested . . . that [the patent in suit] is nothing more than an aggregation of elements old in the art and as such it comes within the rules of *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U. S. 147. Of course, to establish anticipation in such a situation, it is not necessary that all of the elements be found in a single patent or publication. It is enough if the whole of the prior art considered together discloses all of the claimed elements and that no new functional relationship arises from their combination. . . . In order to anticipate a patent for a combination, the prior art must disclose all of the elements of such combination or their mechanical equivalents, functioning in substantially the same way to produce substantially the same result. . . . Rudimentary or unsuccessful experiments with isolated elements of a combination do not anticipate an invention which successfully combines those elements. . . . And, '* * * whoever finally perfects and improves a device and renders it capable of practical, useful and effective operation is entitled to a patent although others had the idea and made experiments toward putting it into practice. * * * '. . . ." (Citations omitted.) *McCul-*

lough Tool Company v. *Well Surveys, Inc.*, 343 F. 2d 381, 398-99 (10th Cir. 1965), *cert. denied.* 383 U. S. 933 (1966).

Application of these principles to the case at bar has led to the conclusion that the '371 reissue patent is not anticipated by the prior art. While the whole of the prior art considered together discloses all of the claimed elements, the prior art does not disclose all of the elements or their mechanical equivalents functioning in substantially the same way to produce substantially the same result as the patent in suit.

3. *Obviousness.*

35 U. S. C. § 103 provides in pertinent part that:

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. . . ."

Application of the statute requires considerations of (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; and (3) the level of ordinary skill in the art at the time the invention was made. *Graham* v. *John Deere Company*, 383 U. S. 1, 17 (1966).

(a). *Scope and Content of the Prior Art.*

As previously indicated, the field of mechanical implements for cultivating growing crops and tilling the soil is a very highly developed and crowded one. At the time of the invention in suit it included all cultivating and tillage equipment such as rotary hoes, discs, shovels, sweeps and scratcher teeth, means for disposing, arranging and moving the same over the ground and means for adjusting the same with reference to the horizontal

and vertical planes. Not surprisingly, therefore, the parties here have readily agreed that the implements employed in the Lehman patent introduced no new element into the art.

(b). *Differences Between the Prior Art and the Claims at Issue.*

As early as 1894 a patent was issued (Maul No. 529,457) on a cultivator having two gangs of free-floating "spading teeth" designed to run on opposite sides of a row of crops, but a front/rear rotary tool arrangement was not disclosed. U. S. Patent No. 675,968 issued to Ogden in 1901 disclosed a machine which could be converted from a cotton chopper into a cultivator. Free-floating cylindrical drums with protruding cultivating teeth served as rotary hoes which were angularly adjustable. As an optional feature a "lister attachment" carrying a "plurality of teeth or shovels" for banking the soil on either side of the row could be mounted rearwardly of the "toothed cylinders". The patent did not disclose means for angling these rear gangs of shovels. In 1939 U. S. Patent No. 2,227,772 was issued to Walker on a cultivator which disclosed rotatable gangs of staggered, sharp-edged blades designed to travel on opposite sides of the row close to the plants. Rearward of these rotary blades shovels were mounted on the same beams which were pivotally attached to the frame forward of the blades. The patent did not disclose an arrangement for allowing the blades to cultivate across the top of the row.

Patents had been issued on numerous other cultivators prior to 1958, but the foregoing are representative of those cited by the plaintiff in support of its charge of obviousness. From all the cited prior art the court has concluded that the principal difference between the prior art and the claims in issue here (Claims 8, 10-13, and 20-24) lies in the fact that in no prior cultivator had there been an arrangement of a row gang of rotary hoes and two rear gangs of rotary hoes, each separately mounted and free-floating and each angularly adjustable so as to permit

"rotatable engagement" of the row of crops with maximum destruction of weeds and grasses and minimal damage to the crops themselves.

(c). The Level of Ordinary Skill in the Art.

It was suggested by Judge Garza in the *Caldwell* decision that the ordinary farmer would be a person of ordinary skill in the art of farm machinery design and construction. While numerous patents have issued to farmers (including the Lehmans in this case) on such machinery, ordinarily the level of skill in the mechanical arts is that of persons engaged in the design and manufacture of machinery rather than that of its users. Here the plaintiff contends that a person of ordinary skill in the art has at least the skill of a graduate agricultural engineer.[7] The court would not go so far, but the evidence does support the finding that the level of skill in the art was reasonably high. Many people were at work in this field which, as noted before, had become highly developed and crowded. Even so, no one had put together this combination of old elements in the manner and configuration which gave the much desired results previously mentioned.

The conclusion is that although the scope and content of the prior art encompassed all the elements found in the patent in suit, there are significant differences between the prior art and the claims at issue here and that notwithstanding the level of ordinary skill in the art was reasonably high, the Lehmans were the first to combine the old elements in a way that produced a new, beneficial and unexpected result. It follows that the invention is not void for obviousness.

Adding weight to this conclusion are the so-called secondary considerations, all supported by evidence in this case, of long-

7. Significantly, plaintiff's expert, Dr. Stanley J. Clark, himself a graduate agricultural engineer, who had been employed by the John Deere Company, was not asked by plaintiff if the patent in suit would have been obvious to him prior to 1958.

felt need for a machine that would eliminate or minimize hand-hoeing; the large number of people who were working on the problem; the fact that most of the elements finally combined by the Lehmans had been known in the art for over fifty years; the skepticism exhibited by many as to whether the invention would work; copying of the invention by established farm machinery manufacturers; the immediate acquisition by Lilliston of the patent rights for a substantial consideration followed by the payment of substantial royalties to the inventors; and the considerable commercial success which Lilliston has experienced in marketing equipment embodying the patented features.[8]

4. *Failure to Clearly Define or Distinctly Claim the Invention.*[9]

Finally, plaintiff strenuously argues that the claims at issue do not particularly point out and distinctly claim the subject

8. There is a growing body of opinion that these secondary considerations should actually be regarded as of primary importance in determining obviousness under Section 103. *See Reeves Instrument Corporation* v. *Beckman Instruments, Inc.*, 444 F. 2d 263 (9th Cir. 1971), and "Laying the Ghost of the 'Invention' Requirement" by the Honorable Giles A. Rich, Associate Judge of the United States Court of Customs and Patent Appeals, a speech given to the Los Angeles Patent Law Association on September 18, 1972. Adoption of these views would certainly alleviate some of the difficulty experienced by the courts in applying what Judge Learned Hand described as "perhaps the most baffling concept in the whole catalog of judicial efforts. . . ." *Lyon* v. *Bausch & Lomb Optical Company*, 224 F. 2d 530, 536 (2nd Cir. 1955).

9. Another position advanced by plaintiff in the pleadings and pre-trial proceedings was the alleged failure of the patent's specification to disclose the manner and process of making the invention in such full, clear, concise and exact terms as to enable persons skilled in the art to make and use the same as required by 35 U. S. C. § 112, but this issue was determined against the plaintiff on its summary judgment motion, *Kelley Manufacturing Company* v. *Lilliston Corporation, supra,* and has not been brought forward in plaintiff's post-trial brief.

matter of the invention as required by 35 U. S. C. § 112. Central to plaintiff's arguments is the contention that the inventive concept claimed by defendant for the invention, namely, that the "cooperative effect" between the combination of the row gangs of rotary hoes and the rear gangs embodied in the claims at issue produces an unusual and unexpected "once-over, all-over" cultivation result, is nowhere spelled out in the patent which is also totally lacking in instruction as to exactly how the elements should be arranged to achieve this "cooperative effect".[10] From this factually indisputable premise plaintiff goes on to argue that since the patent does not teach how others may avoid infringing it, it does not satisfy the definiteness requirements of Section 112, citing *General Electric Company* v. *Wabash Appliance Corporation,* 304 U. S. 364 (1938), and

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10. The court is under the impression that Lilliston's emphasis on "cooperative effect" may bear a closer relationship to the perceived necessity of demonstrating a "synergistic" result in the light of *Sakraida* v. *Ag Pro, Inc.,* 425 U. S. 273 (1976), and *Anderson's-Black Rock* v. *Pavement Salvage Company,* 396 U. S. 57 (1969), than to anything the Lehmans had in mind as they were working on their invention. The fact remains, however, that the arrangement of the admittedly old elements finally arrived at by them and disclosed in the claims in issue did produce a new, long-sought and beneficial result. That they may not have understood precisely the principles underlying the invention is not fatal to the patent.

> "A patentee may be baldly empirical, seeing nothing beyond his experiments and the result; yet if he has added a new and valuable article to the world's utilities he is entitled to the rank and protection of an inventor. And how can it take from his merit that he may not know all the forces which he has brought into operation? It is certainly not necessary that he understand or be able to state the scientific principles underlying his invention, and it is immaterial whether he can stand a successful examination as to the speculative ideas involved." *Diamond Rubber Company* v. *Consolidated Rubber Tire Company,* 220 U. S. 428, 435-36 (1911).

United Carbon Company v. *Binney & Smith Company*, 317 U. S. 228 (1942).[11]

While it is true that specific directions are not given for the adjustment of the elements to fit all conditions, the claims in issue do disclose in general terms arrangements of the row gangs and rear gangs which enable them to achieve a cooperative effect when properly adjusted for crop and soil conditions, and the evidence establishes to the court's satisfaction that this effect does take place. As the row gang cultivates over the row and removes dirt from around and between the plants it is immediately replaced by dirt thrown toward the row by the rear gangs. This may not rescue as many dislodged plants from "impending death" by restoring them to an upright position as one of defendant's witnesses would have us believe, but it provides a highly effective method of weed and grass control while mulching and aerating the soil with minimal damage to the crops, the results in which farmers are most interested. The fact that the farmer himself must experiment and make adjustments to fit particular conditions does not invalidate the patent for indefiniteness. *Procter & Gamble Manufacturing Company* v. *Refining, Inc.*, 135 F. 2d 900 (4th Cir. 1943).

Plaintiff's contention that the patent does not teach how one can avoid infringing it is perhaps best answered in this exchange between counsel for plaintiff and defendant's expert witness:

> Q. If I as a non-Lilliston person, but interested in the art of cultivation, and looking with a view toward developing a cultivator of my own, were to examine U. S. Reissue

11. Plaintiff also argues that the terms "rotary hoe" and "rotatably engage" are not properly defined in the patent, but the court finds that these terms were widely used and understood in the art. As previously noted "rotary hoe" was understood to include a variety of tools and was used by Mr. Whitesides, now a Kelley Vice-President, to label his invention of a "slicer tine". Whitesides also used the term "rotatably engaging" in a patent issued to him on the Kelley cultivator in 1974. PX 10-100, Columns 4, 5 and 6, Claims 1, 2, 3, 5 and 8.

> Patent No. 28,271 . . . where would I find language sufficiently clear that I could determine how to build a cultivator that did not have what you characterized as the "inter-reaction" between front and rear gangs?
>
> A. I am not sure you would find language specifically dealing with that. The purpose of a patent is to tell you what you build to be within the patent. That is, the purpose of the patent is to define the invention and to claim the invention. That is clearly defined in the patent. If you understand that, then there are many things around the periphery that you could build avoiding the patent. The patent's purpose is not to say you can build this and not infringe; you can build that and not infringe; you can build something else and not infringe. The purpose of the patent is to define the metes and bounds of what is within the patent, not to tell you what you can build and not build within the patent (Tr. 9, pp. 1753-55).

The cases cited by plaintiff, *General Electric* and *United Carbon, supra,* are distinguishable and are not regarded as controlling here.

In summary the court is of opinion that Kelley has not carried its heavy burden of establishing by a preponderance of the evidence its charges of invalidity based on prior use, sale and disclosure, anticipation by the prior art, obviousness and failure to clearly define or distinctly claim the invention. The court is strengthened in this conclusion by the fact that the Patent Office has twice found the invention patentable (*see Tights, Inc.* v. *Acme-McCrary Corporation,* 541 F. 2d 1047, 1051 (4th Cir. 1976)); the fact that in the only court test of the patent in suit which went to final judgment the patent was held valid, *Lilliston Implement Company* v. *Caldwell, supra;* and the fact that two major farm implement manufacturers, John Deere Company and International Harvester, settled infringement actions brought against them by Lilliston and agreed to cease manufacturing their allegedly infringing machinery. PX 42 and 43. It follows that Claims 8, 10-13, and 20-24 of the '271 reissue patent are valid. The court has carefully considered plaintiff's other charges

of invalidity, some of which were previously disposed of in the rulings made on plaintiff's motion for summary judgment previously referred to, but none has been found supported by evidence considered adequate to change this result.

* * * * *

In addition to the facts found by the court on the issue of validity the court adopts as its own the following proposed findings of fact and conclusions submitted post-trial by the defendant on this issue: Nos. 4.01-4.07 inclusive; Nos. 5.10-5.14 inclusive; Nos. 6.01-6.09 inclusive; Nos. 9.01-9.04 inclusive; Nos. 12.02, 12.03, 12.05-12.10 inclusive; Nos. 12.17-12.23 inclusive; Nos. 12.25, 12.34 and 13.01-13.12 inclusive.

INFRINGEMENT

In its counterclaim for infringement Lilliston alleges that Kelley's 400 Series KMC Cultivator contains each of the elements in the '271 reissue patent and that they are normally arranged to produce the identical once-over, all-over cultivation result achieved by the patented invention. In denying infringement Kelley conceded that its cultivator may bear some resemblance to the cultivator now being made and sold by Lilliston, but it denies that Lilliston's present cultivator embodies the patented invention and alleges many distinguishing features between its cultivator and the one actually disclosed in the patent. To obviate this argument the court will disregard the current version of the Lilliston cultivator and will refer to a diagram (Figure 1 below) of the Lehman cultivator as shown (substantially) in the patent and a diagram (Figure 2) of the Kelley cultivator as made and sold today.

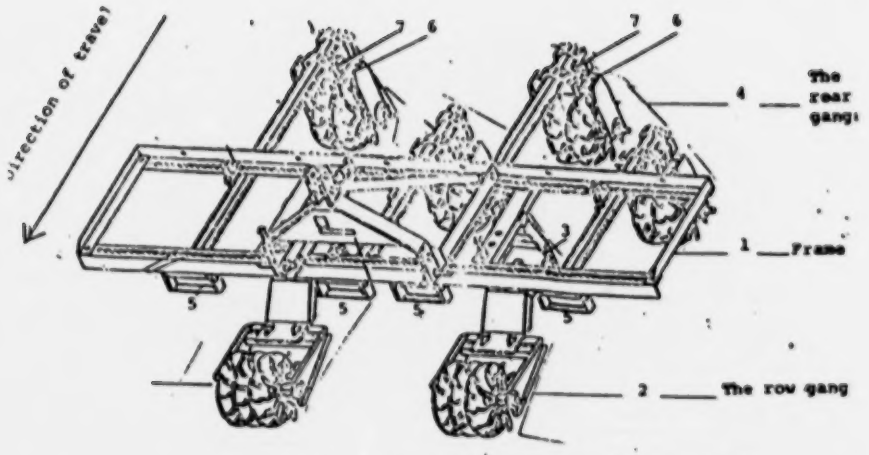

Figure 1. The Lehman Cultivator (two row sections)

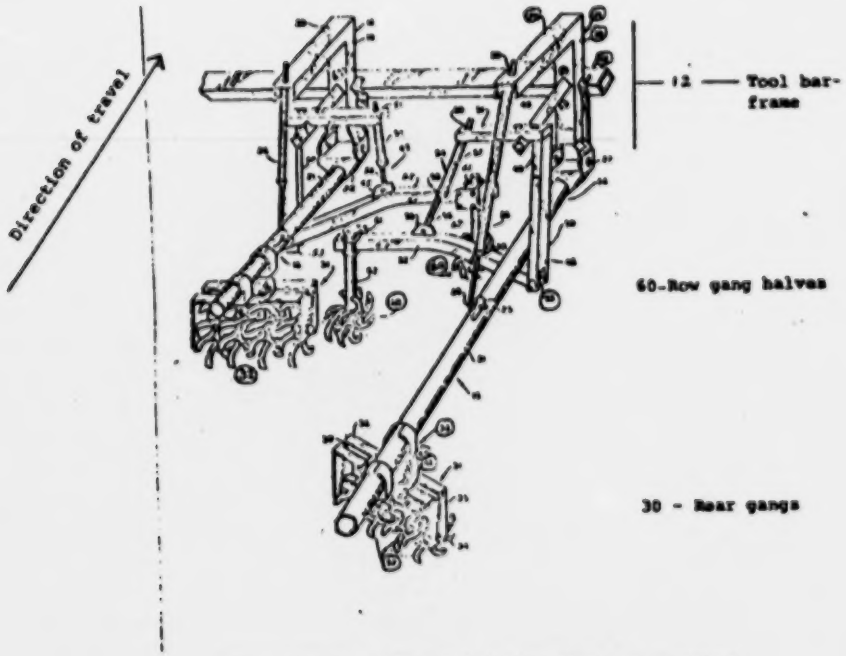

Figure 2. The Kelley Cultivator (one row section)

Claims 8, 10-13 and 20-24 of the patent in suit alleged by Kelley to be invalid are alleged by Lilliston to be infringed. As stated before, Claim 20 is representative of these claims, and we begin by comparing its embodiment in the original Lehman cultivator as shown in Figure 1 with the features of the Kelley cultivator as shown in Figure 2. In the language of Claim 20 the Lehman machine shows:

> A cultivator, comprising
>
> A frame (1) adapted to be moved forwardly over the ground,
>
> A gang of rotary hoes (2),
>
> Mounted on the frame for swinging about a transverse axis (3) to rotatably engage a row of crops during forward movement of the frame,
>
> A pair of additional gangs of rotary hoes (4),
>
> Each mounted from the frame for swinging about a transverse axis (5) to rotatably engage the ground on each opposite side of the row of crops and rearwardly of the engagement of the hoes of the first mentioned gang therewith during forward movement of the frame, and
>
> Means (6) for adjusting the angular relation of the path of rotation of the hoes of each gang with respect to the forward movement of the frame.

Claim 21 which is dependent on Claim 20 only adds

> Means (7) for adjusting and fixing the angular relation of each gang of said pair of gangs with respect to the ground level between positions tilted from one side to the other of a level position.

The Kelley cultivator in Figure 2 by comparison shows (again in Claim 20's language except where shown in brackets):

> A cultivator, comprising
>
> A frame (12), (18), (19), (20) adapted to be moved forwardly over the ground,
>
> A [two-half] gang[s] of rotary hoes (60),

> [Each] mounted on the frame for swinging about a [longitudinal] axis (53) to rotatably engage a row of crops during forward movement of the frame,
>
> A pair of additional gangs of rotary hoes (32),
>
> Each mounted from the frame for swinging about a transverse axis (22) to rotatably engage the ground on each opposite side of the row of crops and rearwardly of the engagement of the hoes of the first-mentioned gang therewith during forward movement of the frame, and
>
> Means (40), (41) for adjusting the angular relation of the path of rotation of the hoes of each gang with respect to the forward movement of the frame.

And continuing the comparison with Claim 21 of the patent the Kelley cultivator also shows:

> Means (38) for adjusting and fixing the angular relation of each gang of said pair of gangs with respect to the ground level and between positions tilted from one side to the other of a level position.

It is readily apparent from the foregoing comparisons that with respect to the rear gangs of rotary hoes on the two cultivators Claims 20 and 21 of the patent in suit read directly on the Kelley cultivator, and the court has no hesitance in so holding.[12] The inquiries before the court are thus narrowed to two:

1. Does the row gang of the Kelley cultivator which consists of two half gangs suspended from two separate arms each mounted to swing about a "longitudinal" axis, that is, one

12. Plaintiff makes the point that the slicer tine-type rotary tools used in the Kelley cultivator differ materially from the earlier type rotary hoe disclosed in the '271 reissue patent, not only in form but in the result it achieves, and that this serves to avoid infringement. As has been seen, however, the slicer tine tools classify as rotary hoes, and given the virtually unlimited adjustments available for the rotary hoes on these machines, the court is not persuaded that there is any substantial difference in the results achievable by the various types of rotary tools that may be employed.

parallel to the machine's direction of travel, equate with the single row gang of the Lehman cultivator operating off one axle and mounted to swing about a transverse axis, that is, one perpendicular to the direction of travel?

2. If so, is the Kelley cultivator designed to and does it achieve the same once-over, all-over cultivation result as the cultivators built in accordance with the patent in suit?

Lilliston confidently asserts that each of these questions should be answered in the affirmative and that the patent should therefore be held infringed. Kelley, on the other hand, insists that the patent requires a single front gang of rotary hoes mounted "for swinging about a transverse axis to cultivate the soil between the plants along the drill of a row of crops with a non-destructive combing action" and that the Kelley cultivator not only lacks such an element but that it is "not for the purpose of performing, and cannot perform the particular method of cultivating disclosed in the patents." The Kelley cultivators, so the argument goes, are simply "for the purpose of performing a conventional method of cultivating unlike that performed by the invention claimed by the patents in suit."[13]

The court has concluded that in addition to the identity of the rear gang elements of the two machines and the common purpose they serve, the row gang elements in the Kelley cultivator are substantially and functionally equivalent to the row gang of the Lehman cultivator, and when the Kelley cultivator with its triangular arrangement of angularly-adjustable, free-floating rotary hoes is run over a row of crops, it is capable of practicing and does in fact practice the invention embodied in the claims in issue.

There is nothing in the patent which limits the row gang to a single gang mounted on one axle, and the fact that the patent

13. Implicit in this argument is the suggestion that the Lehman cultivators do indeed produce a result different from that achieved by conventional cultivators, a proposition which plaintiff spent much trial time and not a little briefing trying to refute.

drawings do not show a split front gang or other possible arrangements of the elements that might be infringing does not avoid infringement.[14] *Straussler* v. *United States,* 154 Ct. Cl. 275, 290 F. 2d 827 (1961).

Although the matter of the mounting of the Lehman row gang on a transverse axis vis-a-vis the Kelley row gang's mounting on a longitudinal axis was debated at length during the trial and in the briefs, the court is not persuaded that the difference between the two mountings is a material one. The object of allowing the gangs to swing about any axis is simply to allow them to "float" freely and follow the contour of the ground in order to achieve closer cultivation of the entire surface.[15]

The question of whether the Kelley cultivator is designed to and does in fact achieve the same once-over, all-over cultivation result as cultivators built in accordance with the patent in suit must also be answered in the affirmative. This conclusion follows from the close similarity between the manner in which the Kelley cultivator is advertised to operate, from the testimony of witnesses who have observed and compared the operation of the cultivators in the fields and from the movies of these operations as shown by Lilliston during the trial.[16]

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14. In 1962 Lilliston began using the split row gang on its cultivators and mounting them on a parallel linkage device patented by Mr. Whitesides (DX 11-71, U. S. Patent No. 3,203,487), who was then with Lilliston. The split gangs continued to "free-float" together on a transverse axis and to remain laterally adjustable so as to achieve "rotatable engagement" with the row crops.

15. It is true, as plaintiff's expert, Dr. Stanley Clark, testified, that this mounting of the Kelley row gangs causes them to describe arcs in the vertical plane which action may in turn bring the rotary hoes slightly closer to or slightly further away from the plants as they go up and down with the contour of the row, but the court is convinced that the effect of this, if any, on the cultivating result is minimal.

16. Kelley's expert, Dr. Clark, gave testimony to the contrary, but the experiments which he described appear to have been con-

(Footnote continued on next page.)

To begin with, the Kelley cultivator is built in accordance with U. S. Patent No. 3,794,123 (DX 10-100) issued to Jack C. Whitesides after he left Lilliston and joined Kelley. The diagram shown in Figure 2, *supra,* is adapted from the diagram shown in the patent. The Whitesides invention is summarized in the patent as follows:

> "Briefly described, the present invention comprises a cultivator which utilizes a plurality of independently suspended rotary hoe gangs to till the soil along a plurality of crop rows. The rotary hoe gangs are mounted on a framework and are adjustable with respect to the framework so that the gangs of rotary hoes can be positioned in various different arrangements, including arrangements where virtually all of the soil along a crop row can be tilled without leaving any untilled portions. The cultivator has its rotary hoe gangs arranged in groups for each crop row, with each group including one pair of rotary hoe gangs each being swingable about an axis normally extending along the crop row, and a second pair of rotary hoe gangs each being swingable about an axis extending normally transverse to the crop row. The first pair of rotary hoe gangs are each mounted on a laterally extending support leg which extends across the crop row from its respective rotary hoe gang, and the rotary hoe gang of each laterally extending support leg can be positioned along the length of its support leg in overlapping or spaced relationship with respect to the other rotary hoe gangs of the group in various lateral positions along the crop row to be tilled by the group of rotary hoes." (Col. 1, Lines 37-60)

Claim 1 of the Whitesides patent reads:

> "A cultivator comprising a framework for towing by a tractor or the like in a forward direction over the ground along crop rows, a first gang of rotary hoes mounted on said framework for rotatably engaging a crop row closely adja-

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(Footnote continued from preceding page.)
trolled and did not include several of the experiments performed by defendant's experts. Significantly, Kelley brought no movies to the trial to illustrate the testimony of its witnesses.

> cent the crop in the crop row and arranged to swing with respect to said framework about an axis extending normally approximately parallel to the direction of forward movement of said framework and laterally displaced from the first gang of rotary hoes across the crop row, and a second gang of rotary hoes mounted on said framework for rotatably engaging a crop row further away from the crop in the crop row than said first gang and arranged to swing with respect to said framework about an axis extending transverse to the direction of forward movement of said framework." (Col. 4, Lines 52-67)

Other claims in the patent are similar, and it is perfectly apparent to the court that Whitesides was making a conscious effort to patent a cultivator that would do everything the Lilliston cultivator would do and at the same time, it is assumed, he wished to avoid infringement of the Lehman patent if possible.[17]

The close similarity between the operation of the Kelley cultivator and cultivators built in accordance with the patent claims in suit is further graphically illustrated by a comparison of the assembly instructions of the Kelley Owners Manual (DX 91-73, p. 6) with the assembly instructions of the Lilliston Owners Manual (DX 139-175, p. C). Diagrams from the two manuals

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17. No presumption that the Kelley cultivator does not infringe arises from the fact that Whitesides was issued a patent on the independent suspension for the row gang halves which is claimed to be an improvement over the suspension systems disclosed in the '271 reissue patent.

> ". . . If the inventive idea of the original patentee has been appropriated, and the alleged infringing device contains the material features of the patent in suit, the court will declare infringement, even when those features have been supplemented or modified to such an extent that the defendant may be entitled to a patent for the improvement." *Crown Cork & Seal Company* v. *Aluminum Stopper Company,* 108 F. 845, 866 (4th Cir. 1901).

are reproduced as Appendix B attached and even a cursory inspection shows the two diagrams to be virtually identical.[18]

Still further evidence of the similarity between the operation of the Kelley cultivator and the cultivators made in accordance with the Lehman patent is to be found elsewhere in the Kelley Owners Manual (DX 91-73 at p. 3) where it is said:

> "5. ROW SPIDER GANG ADJUSTMENT
>
> "a. The function of the row gang is to cultivate the soil close to the crop row. Each row gang half can be angled to move soil to the row or away from the row. The spiders should be run as close to the row as possible without harming the crop.
>
> "6. REAR SPIDER GANG ADJUSTMENT
>
> "a. The function of the rear gang is to cultivate the area between crop rows. Gangs can be angled to move soil to the row or away from the row and can be tilted on the pipe to conform to bed shapes.
>
> "7. TYPICAL GANG SETTINGS
>
> "a. The assembly layout drawing shows a typical cultivator setting. Observe that the row gangs are angled to move soil away from the crop row and the rear gangs are angled to move soil to the crop row. This particular setting is recommended for larger crops or second cultivation. For small crops or the first cultivation, it is recommended that the row gangs be angled to move soil to the row and the rear gangs angled sufficiently to uproot all weeds as the spiders move soil away from the row."

The deposition testimony of C. J. Whitfield, a mechanical engineer who was formerly Lilliston's senior project engineer and now a Kelley Vice-President, confirms that the Kelley cultivator

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18. It should be noted that the diagram of the Lilliston cultivator in Appendix B is of a later model with a split and staggered row gang rather than the single row gang of the original Lehman cultivator, but the evidence has shown no significant difference between the cultivation results achieved by the two models.

is claimed by Kelley to do everything the Lilliston machine will do and more.

> Q. Did you think the Lilliston rotary cultivator in 1972 was a reasonably effective substitute for a Kelley rotary cultivator?
>
> A. I am sure some Lilliston dealers and customers all felt so, but I would feel ours was a superior machine.
>
> Q. Yours would do everything that the Lilliston machine would do and something more; is that what you are saying?
>
> A. I think that pretty well sums it up. We intended to do more. (Tr. 9, p. 1648)

Finally, defendant's witnesses testified convincingly that the Kelley cultivator and the Lilliston-Lehman machines were functionally equivalent and the motion pictures (DX 30-201) shown by defendant corroborated their testimony.

The conclusion is inescapable that the Kelley cultivator not only contains the same or the functionally equivalent of all the elements disclosed in the '271 reissue patent claims in suit but it is also designed to and does in fact achieve the same once-over, all-over cultivation result as is achieved by cultivators embodying the claims of that patent which are in issue here. *Specialty Equipment & Machinery Corporation* v. *Zell Motor Car Company*, 193 F. 2d 515 (4th Cir. 1952). The patent is infringed.

* * * * *

In addition to the facts found by the court on the issue of infringement the court adopts as its own the following proposed findings of fact and conclusions submitted post-trial by the defendant on this issue: Nos. 7.01-7.08 inclusive; 11.01-11.13 inclusive and 11.16-11.25 inclusive.

The conclusions reached with respect to validity and infringement render moot plaintiff's claim for attorney's fees pursuant to 35 U. S. C. § 285. At this time the court is of the opinion that defendant's motion for attorney's fees should be denied, but this question will be left open until the hearing on the issue of

damages at which time evidence may be submitted on the question by both parties.

CONCLUSION

The court's findings of fact and conclusions set forth in this memorandum of decision are summarized as follows:

1. The court has jurisdiction of the parties and subject matter.

2. United States Reissue Patent No. 28,271 is valid and it is infringed by the 400 Series KMC Cultivator manufactured and sold by Kelley Manufacturing Company.

3. Pursuant to Rule 54(b), F. R. Civ. P., the court finds that there is no just reason for delay, and subject to an accounting for the determination of damages due defendant on its counterclaim for infringement final judgment will be entered with respect to the First Claim in the plaintiff's complaint.

/s/ F. T. Dupree, Jr.
F. T. Dupree, Jr.
United States District Judge

June 2, 1978

APPENDIX A

Objects of the Invention Reissue Patent No. 28,271.

An object of this invention is to provide a rotary cultivator having separate gangs of "free-floating" rotary hoes which will engage the row crops with a greater force than heretofore possible with cultivators having conventional free-floating gangs of hoes.

Another object is to provide a rotary cultivator having separate gangs of free-floating rotary hoes which are individually free to conform to the contour of the row each engages.

A further object is to provide a rotary cultivator having separate gangs of free-floating rotary hoes whose ground turning action may be regulated by their angular adjustment with respect to the row crops without a substantial change in their tracking pattern.

Still another object is to provide a rotary cultivator having rotary hoes which will uniformly engage the row crops as well as the ground between the rows regardless of the contour thereof and which will permit the weeds to be pulled from the row crops and covered with dirt turned from between the rows.

A still further object to provide a rotary cultivator of the type above described in which the rotary hoes are mounted with respect to one another in a compact arrangement which, at the same time, enables them to engage the ground with maximum leverage.

Yet another object is to provide such a rotary cultivator which is readily adjustable in a manner to prevent dirt from between the rows being turned onto the crops.

Another object is to provide a cultivator which is readily adjustable for use in cultivating different widths of rows, or

even double row crops, as well as in turning a greater or lesser amount of dirt onto the rows.

Still another object is to provide a cultivator in which the cultivating elements thereof are selectively interchangeable with one another to turn dirt from between the rows in either of two directions.

Still a further object is to provide a cultivator having a vehicular frame for supporting the cultivating elements in a manner to permit the force with which such elements engage the ground to be adjusted to a desired amount.

A still further object of this invention is to provide an improved cultivator of the type above described in which the ground intermediate either high or deep planted crops may be turned either toward or away from the crops.

Yet another object is to enable the above-described cultivator to be converted for such use with a minimum of time and expense.

Other objects, advantages and features of this invention will be apparent to one skilled in the art upon a consideration of the written specification, the attached claims and the annexed drawings.

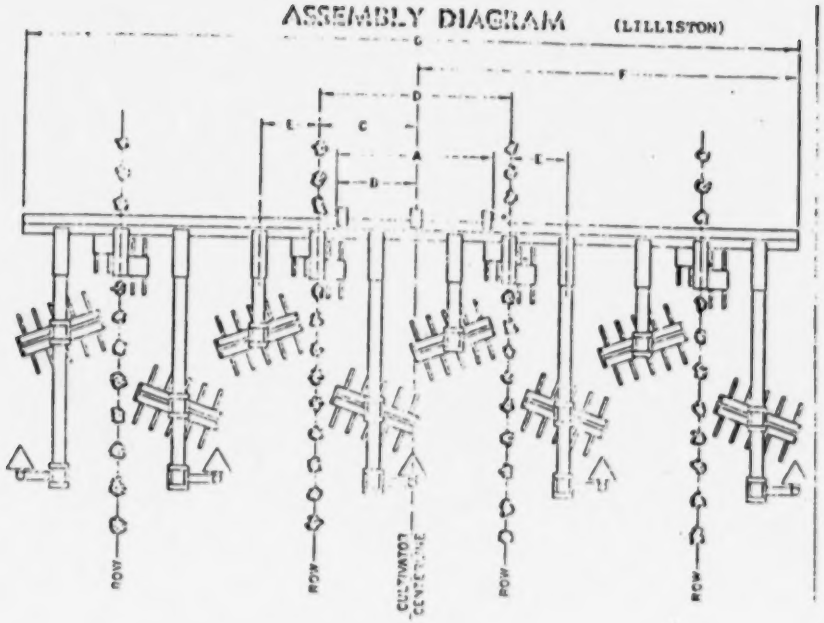
These and other objects are accomplished, in accordance with this invention, by a cultivator which comprises a frame adapted to be moved forwardly over the ground and a plurality of separate gangs which are mounted from the frame for swinging about a transverse axis to rotatably engage spaced-apart rows of crops in a laterally extending row during forward movement of the frame. Each such gang is also swingable about a vertical axis to adjust the angular relation of the path of rotation of the hoes thereof with respect to the rows; and means are carried by the frame for turning the ground intermediate adjacent rows of crops and rearwardly of the engagement therewith of the gangs with the crops.

From the foregoing, it will be apparent that each gang is free-floating so as to conform to the ground levels of the row crops. It will also be apparent that the angular adjustment of each gang enables regulation of the extent with which the weeds are chopped out of the crops.

Each separate gang is pivotally mounted from the frame for swinging about an axis rearwardly of the engagement of the hoes of such gang with the ground. In this manner, the hoes engage the ground with a "pushing" action which causes them to penetrate the ground with a greater force than the conventional "pulled" type of hoes. In one form of the invention, the support for each gang of rotary hoes may be pivotally mounted from the frame for swinging about a longitudinal axis so that each gang is free to rock into conformity with the contour of the row it engages.

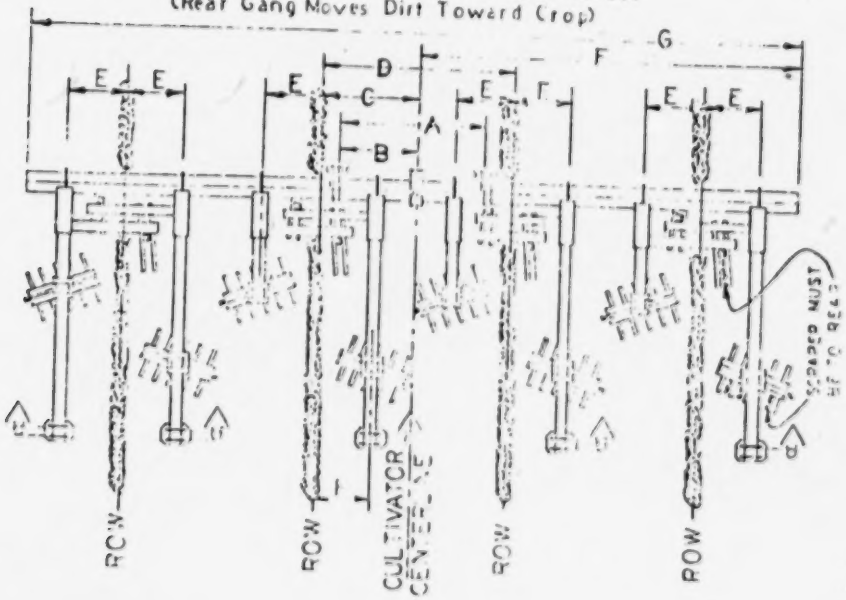
APPENDIX B

ASSEMBLY DIAGRAM (LILLISTON)



ASSEMBLY LAYOUT (KELLEY)

For Row Spacings Of 28 Inches And Wider
(Rear Gang Moves Dirt Toward Crop)



DEFENDANT'S POST-TRIAL FINDINGS OF FACT ADOPTED BY THE COURT

IV. TECHNOLOGICAL BACKGROUND

4.01 For many years, farmers have planted crops, such as cotton, corn or maize, soybeans and others, in rows. These crops have required cultivation to control weeds and grasses. Growing crops draw substantial amounts of moisture and nutrients from the soil to sustain their growth to maturity during the growing season. Weeds and grasses, however, often exhibit even faster growth rates, and, if left unchecked, compete with the crops for the available moisture and nutrients, tending to smother small and emerging crops thereby reducing yields or quality of the crop. Field conditions during the critical period when the crop is emerging from the soil may further aggravate this situation by preventing the farmer from getting into the field to cultivate. That is, rains coinciding generally with emergence of the crop often make the soil in the field muddy and prevent the farmer from cultivating the row-crops. Row-crop cultivation is also beneficial in that the crust commonly forming on the soil after a rain should be broken or mulched to aerate the soil and improve moisture absorption and decrease loss of moisture through capillary action. Accordingly proper cultivation enhances plant growth. (Tr. 913-917)

4.02 In earlier times, cultivation was accomplished by hand- and animal-powered equipment including hand-hoeing. Although requiring more labor than mechanized cultivation, prior to the Lehman invention hand-hoeing was used to cultivate the crop in the row between adjacent plants. (Tr. 918-926, Tr. 1549)

4.03 An extremely wide variety of mechanized cultivators were developed before the Lehman rotary cultivator to reduce

the labor required and speed the cultivating operation so that each farmer could farm more land. These included cultivators employing discs, sweeps or shovels. Although the farmer could set up the cultivator and operate at slow speeds to cultivate as close to the plants as possible, these machines could not operate on the crop row itself or close enough to the crop row to cultivate between adjacent plants in the row without destroying or seriously damaging the crop stand. Consequently, hand-hoeing in the row was still necessary. (Tr. 918-926, Tr. 1128)

4.04 Most such cultivators were mounted at the front of a tractor in order for the operator to see the crops to prevent destroying or seriously damaging the crop stand. When the crop is emerging, and for some time thereafter, the farmer frequently used shields to prevent such cultivators from covering the young crop with soil. The shields were commonly located on the opposite sides of and in close proximity to the crop row with the cultivating tools, i.e., the sweeps or shovels, located outwardly therefrom. (PX 81-335, DX 36-241) The farmer necessarily operated at slow speeds, 1½ to 2 miles per hour, to keep the cultivator properly aligned with the crop row. (Tr. 1545-46) Only after the crop has grown sufficiently such that there was no longer any danger of the crop being covered could the shields be removed. By then the weeds in the crop row were sufficiently large and rooted in the row to minimize the beneficial effects of cultivation. (Tr. 1127-29)

4.05 Farm implements commonly known as rotary hoes were used to break the soil crust and assist the seedlings in emerging from the soil. As soon as weeds or grasses were firmly rooted the rotary hoe had little effect on them. Rotary hoes, although they were designed to be flexible to follow beds and uneven ground, were not used to shape the earth to form crop beds. Conventional rotary hoes followed the row straight on and were not angled to displace the soil laterally. (DX36-241, Tr. 926-930)

4.06 Rotary-hoe attachments for conventional row-crop sweep cultivators comprised groups of three or four rotary hoes which, as in the conventional rotary hoe, were run straight on directly over the crop rows, between the front sweeps or shovels. In addition to breaking any crust that was present and tending to uproot small weeds not yet firmly rooted, the rotary hoes served as rotary shields for the sweeps or shovels operating between the rows to prevent them from throwing soil onto the crop row and covering the plants in the row. (DX36-241, PX44-282, Tr. 745)

4.07 At the time of the Lehman invention, herbicides were not in general use. Today, row-crop cultivators are often used in combination with herbicides. Despite the value of using chemical herbicides, and the existence of few weeds in the crop, cultivation is important for its soil-conditioning action—crust-breaking and improved aeration and moisture absorption. Therefore, today, a combination of cultivation and chemical weed control is commonly used. (Tr. 1128)

5.10 On April 1, 1958, the patentees filed two applications on rotary cultivators in the United States Patent and Trademark Office—Serial Numbers 725,640 (directed to the Lehman wide rear rotary hoe gang cultivator) (PX18-101) and 725,641 (directed to the Lehman scratcher type cultivator) (PX19-102). On March 18, 1959 the patentees filed a continuation-in-part application Serial Number 800,304, which included not only the subject matter of application Serial Numbers 725,640 and 725,641, but also introduced the twisted scratcher teeth and split rear rotary hoe gang concepts. (PX20-103) On September 7, 1960 they filed application Serial Number 54,468 for a similar type cultivator employing tilted rear gangs of rotary hoes. (PX21-104) On June 12, 1961 they filed application Serial No. 113,993 which combined the applications filed March 18, 1959 and September 7, 1960 into a single application at the request of the patent examiner, and it was on this application that the original patent in suit, No. 2,994,387 was issued on

August 1, 1961. (PX22-105, see pages 50 and 51). (Tr. 1297-99)

5.11 The prosecution of the '387 patent followed the conventional practice of consolidating developments of an invention, filed as separate applications, into a single application and issuing a single patent to avoid double patenting. (Tr. 1300-01)

5.12 This patent, now the '271 reissue patent, has an effective filing date of April 1, 1958 and includes claims 8, 10-13, and 20-24, inclusive, directed to the commercial embodiment of the Lehman cultivator which has free-floating row gangs angled for rotatably engaging a row of crops in combination with free-floating rear gangs angled for cooperative interaction with the row gangs to produce a "once-over all-over" cultivation. (Tr. 1304-06, Tr. 1547-50)

5.13 The Lehman Equipment Co. sold their cultivators which they designated with their trademark "Roll-N-Cultivator" from sometime in 1959 until 1961, having at least sixty-five (65) dealers. (Tr. 1544 and see 212 F. Supp. 413, at 415) Initially, the Lehmans encountered much skepticism as to the capability of their rotary cultivator. They were required to demonstrate the cultivator to convince farmers of its ability to cultivate "once-over all-over" without destroying or causing significant damage to crops. (Tr. 1556-58)

5.14 In early 1960, Lilliston's territory manager in Texas, James B. Pike, saw the Lehman "once-over all-over" "Roll-N-Cultivator" and after seeing it in operation, reported to his superior at Lilliston that he had seen a new tool, the like of which he had never seen before and felt that it was something that Lilliston should take a look at. (Tr. 1561-69) William E. Hoffmann, then Vice President of Sales at Lilliston, then travelled to Texas and asked Charles Lehman if he could see the Lehman rotary cultivator at work, which he did. He was astonished that the row gangs could be run over the crop without crop damage. He even confirmed this crop condition the

next day after the cultivator demonstration. Mr. Hoffmann reported back to Lilliston that the tool had great promise and suggested Lilliston investigate the possibility of working with Lehman Equipment Co. to market the rotary cultivator on a wider scale than could be done by the Lehman Equipment Co. (Tr. 1570-77)

VI. ACTIVITIES OF LILLISTON

6.01 In January, 1961 Lilliston acquired exclusive rights to make, use and sell the rotary cultivator embodied in the original Lehman patent. (DX40-22) Lilliston immediately worked on the adaption to the Lilliston production capabilities of the cultivator structure, which theretofore had been fabricated by Lehman Equipment Co. (Tr. 891, 894-896, 1596-1600, 1644-45) The first model from which the adaptions were made is exemplified in DX14-235. (Tr. 896)

6.02 In the period 1961-1964, consistent with Lilliston's policy of product improvement, additional refinements in the Lehman Equipment model were made. These included refinement of the depth and force regulation, refinement of the free-floating, row gang mounting to permit the row gangs to be pushed or pulled, and providing adjustable lateral spacing of the rotary hoes in the row gang. (Tr. 930-932)

6.03 This later refinemen was made to provide more versatility in the use of the row gang and permit the cultivator to be used for a longer period of time during the growing cycle of the plant with minimum damage to the plant. The suggestion to adjust the lateral spacing of the inside rotary hoes in the row gang was derived from one of the Lehman co-inventors. The spacing was accomplished by the use of a separate spacer mounted on the axle of the row gang or the use of different hub configurations. (DX15-176, Tr. 932-937)

6.04 Versatility of the Lehman cultivator was further improved by separating the row gang into two halves. (DX16-

173) This refinement permitted the farmer to eliminate the use of spacers and different hub configurations but achieve the same result. The unpatented arrangement which was incorporated in the 1964 Lilliston-Lehman cultivator permitted the row gang halves to be transversely aligned, angled in the same direction, or angled in opposite directions or adjusted in or out as the farmer desired. The free-floating row gang mounting structure remained unchanged. (Tr. 937-40)

6.05 The first Lilliston-Lehman cultivators manufactured by Lilliston employed a rectangular frame on which the row gangs and rear gangs were mounted. The rectangular frame was used through 1964. In 1962 development work was initiated on the use of a square tool bar frame on which the row gangs and the pairs of rear gangs could be mounted. (Tr. 942-944)

6.06 In 1962 Jack Whitesides, who was then a design engineer working for Lilliston on the Lilliston-Lehman cultivator, originated a new design of a free-floating suspension arrangement for mounting split row gang halves on a tool bar frame. (Tr. 945) He characterized his design in a description written in September, 1962 (DX19-66) as:

> "The split row gang assembly consists of two gang halves (1) attached to beam (2) which floats on a parallel linkage. Each gang half consists of one or more (normally two) spiders, an axle, and standard.
>
> *The split row gang is designed to cultivate directly over the crop row.* The nature of various crops, soils and personal preferences requires that the spacing between the inner two spiders on the row gang be adjustable in order to accommodate different sized foliage. Any desirable spacing can be obtained by adjusting each row gang half laterally." (emphasis added)

6.07 Mr. Whitesides' design for a free-floating suspension arrangement was patented and issued as U. S. Patent 3,203,487 (DX11-71). The application for patent was prepared and prosecuted by Harold Jones, Kelley's present counsel. The

patentee did *not* succeed in obtaining claims to cover the splitting of the row gang halves per se. Instead the patent had to be limited to the suspension arrangement for mounting the row gang halves to permit their independent adjustment for achieving the movement of dirt as well as the lateral adjustment for accommodating crop rows having foliage of varying width and substantial height. The suspension arrangement has a floating action which:

> "permits the gang halves to adjust their vertical positions to the terrain over which the rotary hoe gang assembly is passing and prevents the arms of the rotary hoes from penetrating the earth beyond the upper crust and damaging the roots of the crop being cultivated." (Col. 2, lines 41-46)

i.e. a free-floating action.

6.08 Mr. William G. Moore, Vice President/Engineering for Lilliston who was personally familiar with all of the row gang refinements and had observed the cultivating effect of Lilliston-Lehman cultivators which employed the different row gang arrangements, in his testimony described the equivalency between the use of spacers in the row gang, the initial splitting of the row gang into halves on a common transverse center line but arranged to permit alternate settings for angular adjustment of the row gang halves, and the current arrangement of staggering the row gang halves employed in using the Whitesides design for mounting the row gang. (Tr. 969-995) Mr. Moore further testified that the cultivating effect achieved with Lilliston-Lehman cultivators which employ either spacers in the row gang, or the split row gang arrangement, or staggered row gang arrangement is identical to the cultivating effect achieved by the initial model of Lilliston-Lehman cultivator. In all models the same cultivating results could be achieved in accordance with the inventive concept embodied in the '271 reissue patent. (Tr. 995-999)

6.09 During the course of refining the original Lehman rotary cultivator to provide the current model of Lilliston-Lehman Rolling Cultivator implement, Lilliston continuously reviewed the changes with their attorneys, including Harold Jones, to determine whether each particular model such as the current model of the Lilliston-Lehman Rolling Cultivator implement was covered by the original Lehman patent (Tr. 994-5).

VII. COPYING OF THE LILLISTON-LEHMAN ROTARY CULTIVATOR BY KELLEY

7.01 Lilliston has been manufacturing and selling farm implements for over 50 years and rotary cultivators since 1961. Kelley, on the other hand, has been in business since 1967 and has sold rotary cultivators since 1971. (Stipulation of Facts, paragraphs 11 and 12)

7.02 Prior to 1971 the only cultivation equipment manufactured and sold by Kelley was a power tiller (Tr. 1647) in which the cultivating elements were not ground driven but were driven by the power take off of the tractor. Whitesides was placed in charge of designing the 400 Series KMC Cultivator. (Tr. 1629-30)

7.03 During his employment with Lilliston, Mr. Whitesides was named inventor in several patent applications which were assigned to Lilliston (Stipulation of Facts, para. 14) and which were prepared and prosecuted by the firm of Newton, Hopkins and Jones. Included among these applications were the applications that issued as Whitesides Patent 3,203,487 (DX11-71) and Whitesides Patent 3,232,356 (DX12-233). As pointed out above (Para. 6.07) Mr. Jones prepared and prosecuted the former in the U. S. Patent and Trademark Office; while Messrs. Jones and Thomas prepared and prosecuted the latter. Mr. Harold D. Jones, Jr. was a partner and Mr. George M. Thomas was an associate in that firm. Messrs. Jones and Thomas now represent Kelley in this action.

7.04 Unbeknownst to Lilliston when Mr. Whitfield left Lilliston and, later when Mr. Whitesides left Lilliston, to join Kelley, as will be shown below, they took with them a considerable quantity of confidential Lilliston documents, including blueprints, price lists, cost information, sales projections, knowledge of suppliers, knowledge of a specific ductile iron composition and other trade secrets and know-how. (Tr. 1657-58)

7.05 For example, a specific alloy and heat treatment for manufacturing rotary hoes referred to in a Lilliston blueprint of a pivot bushing (DX99-132) was taken and used by plaintiff, ostensibly as "reference material". Mr. Whitesides acknowledged it was this "reference material" which "made the bushing work". (Tr. 1641).

7.06 Additional useful confidential information taken by Messrs. Whitesides or Whitfield and utilized by plaintiff include: a list of suppliers of material rated as reliable by Lilliston (DX112-146; Tr. 1654); and cost information on various materials used in manufacturing (DX114-148, DX125-159 and DX127-161; Tr. 1653-1655).

7.07 Plaintiff also used information from the misappropriated documents not only to get in the market faster, but to be able to ascertain *when* to get in. Lilliston's "Five Year Forecast" (DX115-149) dated July 19, 1966 was prepared for defendant's top management team members. This 8-page document taken from Lilliston to plaintiff by Mr. Whitfield contains sales and engineering cost projections for Lilliston's production equipment, including cultivators and peanut harvesting equipment, for the years 1967-1971. During this period plaintiff began production of both these items. Plaintiff therefore had in its possession this top level document laying bare the projections of its main competitor, defendant.

7.08 Kelley utilized this information and the acknowledged experitises of Messrs. Whitfield and Whitesides to assist in the design of its 400 Series KMC Cultivator. No attempt was made

to follow the prior art to which it now pays lip-service. Not only do substantial portions of the Kelley cultivator conform exactly to the Lilliston-Lehman rotary cultivator, including the rear gang assemblies, but the Kelley front row gang halves are mounted so as to be capable of cooperating with the rear gangs to effect the novel and unique "once-over all-over" cultivation produced by the Lehman cultivator and the refinements thereof incorporated in the Lilliston/Lehman Rolling Cultivator (DX25-223 and DX30-201).

9.01 The inventive concept embodied and claimed in the aforementioned claims involves a basic cultivator unit which can be combined to provide multiple units for simultaneously cultivating a plurality of rows of crops. Each cultivator unit includes gangs of rotary hoes which work in relation to each row of crops *in cooperation* with each other with no significant damage to the crops. The front row gang rolls over and works the crop row. The rear gangs work the ground between the rows of crops rearwardly of the row gang. Each gang is free floating and independently angularly adjustable. The cooperation is achieved by angling the row gang to aggresively cultivate right in the row of crops and by angling the rear gang to immediately thereafter move dirt toward the row of crops. (Tr. 892-4, 969-973, 980-999, 1547-1550, 1741, 1304-6) This *cooperation* unexpectedly achieves a "once-over all-over" cultivation without significant damage to crop. (Tr. 1149-50, 1543) Tilting of the pair of rear gangs with respect to ground level is also available to permit the cultivation of high planted or deep planted crops.

9.02 The "once-over all-over" cultivation achieves in a single pass along the crop row substantially complete removal of the weeds and grasses as well as the desired mulching and crumbling effect on the soil from crop row to crop row including the area between the aligned plants with no significant damage to the plants. As a result hand hoeing is seldom required. (Tr. 892-4, 1305-6)

9.03 This result cannot be achieved by the use of row gangs alone, pairs of rear gangs alone, or two cultivators operating in tandem. (Tr. 1737-8, 1741-2)

9.04 Nor can it be achieved by a combination of elements other than that embodied in the claims in issue with the row gang in front and the rear gangs on the side rearwardly of the row gang (Tr. 1553-1555)

XI INFRINGEMENT BY KELLEY

A. The Kelley 400 Series KMC Cultivator

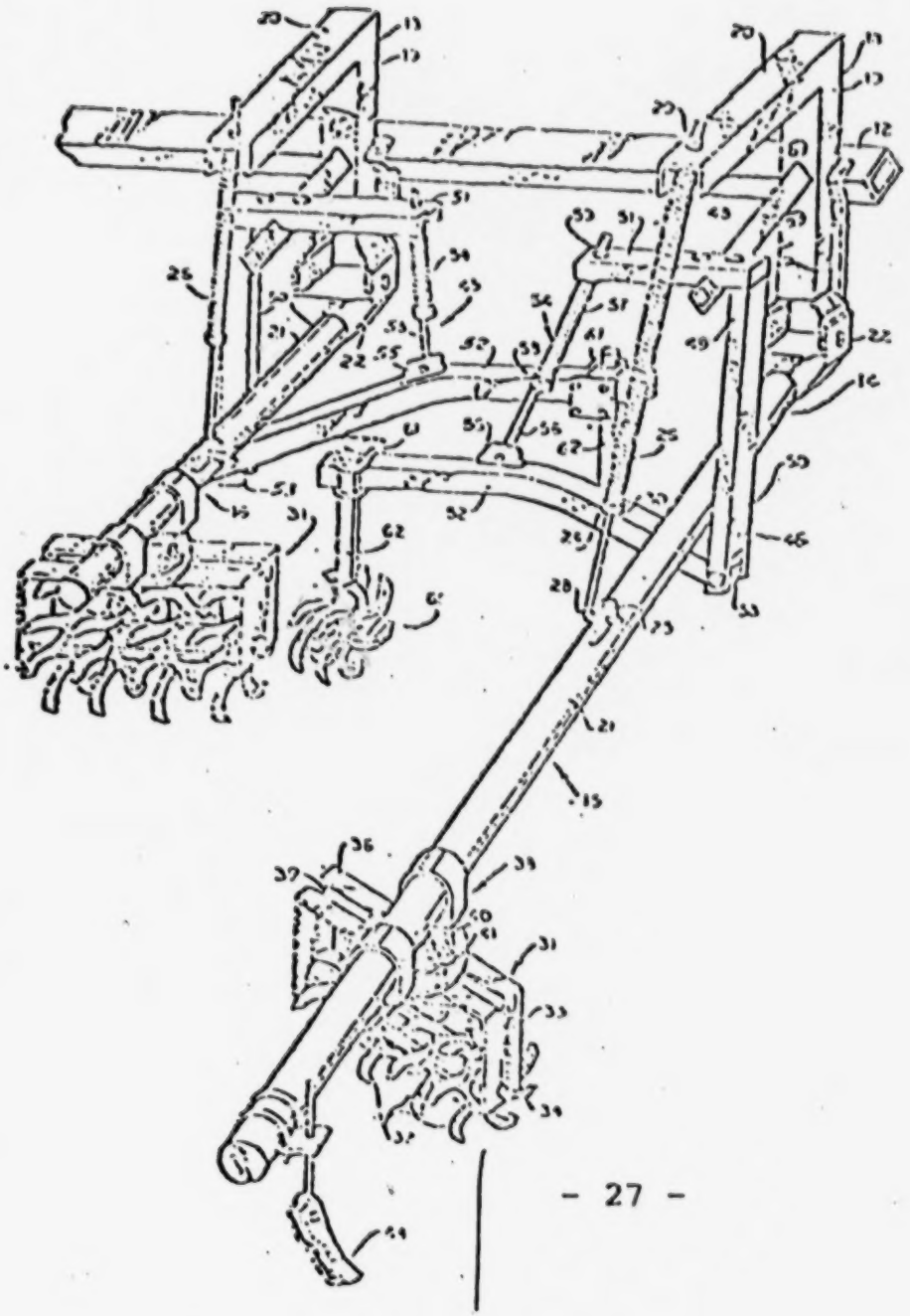
11.01 The first 400 Series KMC Cultivator marketed by Kelley is shown in the 1972 Kelley Owner's Manual and Parts Book. (DX90-72 and see Exhibit A attached to Complaint) In this model the mounting arrangement for the row gang halves was attached directly to the rear gang pipes which are pivotally mounted to the tool bar frame on an axis transverse to the direction of movement of the cultivator. This mounting arrangement provided a free-floating action for the row gangs which permitted them to conform to the contour of the row that each gang engages. In 1971-1972 Lilliston complained to Kelley about the infringement of the original Lehman patent by this model of the 400 Series KMC Cultivator. (Exhibits B and C attached to Complaint)

11.02 Kelley thereafter changed the row gang mounting arrangement directly to the tool bar frame. (DX22-237A) This change is embodied in the later model of the 400 Series KMC Cultivator which is illustrated in the 1973, 1974, 1975 and 1977 Kelley Owner's Manual and Parts Book. (DX91-73, DX92-74, DX93-75, DX8-231) in the late model 400 Series KMC Cultivator the row gang beam* to which the row gang halves are mounted (See DX8-231, p. 17) is pivotally mounted

* This element is designated as a pivotal support leg 52 in the Whitesides '123 patent (DX10-100).

on a cap screw inserted in the row gang bracket parallel to the direction of movement of the cultivator. This suspension system has a floating action. This change was incorporated in the 400 Series KMC Cultivator starting in 1973.

11.03 The row gang mounting arrangement was designed by Jack Whitesides who obtained U. S. Patent 3,794,123 (DX10-100) and assigned it to Kelley. (Stipulation of Facts, para. 14) The illustrative embodiment of the complete cultivator including row gangs and rear gangs described in the specification of the patent is the same as the current model 400 Series KMC Cultivator. (Tr. 1629-30) The following illustration is a reproduction of Figure 3 from the Whitesides '123 patent.



11.04 The adjustability of the row gangs is described in the '123 patent at Col. 1, lines 40-45 and Col. 4, lines 20-27 as follows:

> "The rotary hoe gangs are mounted on a framework and are adjustable with respect to the framework so that the gangs of rotary hoes can be positioned in various different arrangements, *including arrangements where virtually all of the soil along a crop row can be tilled without leaving any untilled portions.*"
>
> * * *
>
> "The support legs of each support leg assembly 45 and 46 therefore normally extend across and overlap the crop row, and the rotary hoe gang of each pivotal support leg 52 can be moved along the length of the pivotal support leg so that the paths of the rotary hoe gangs can be positioned *in overlapping or offsetting relationship with respect to each other across a crop row, as may be desired by the operator of the cultivator.*" (Emphasis added)

11.05 On either model of the 400 Series KMC Cultivator, the row gang halves are laterally adjustable to bring the row gang halves into floating, rotatable engagement with the spaced apart rows of crops depending upon soil conditions, type of crop, maturity of the crop being cultivated, and other factors considered by the farmer in adjusting the 400 Series KMC Cultivator for use.

11.06 The rear gangs are mounted on support bar assemblies 15 and 16 and as shown in Figue 2 of the '123 patent, the rear gangs are on opposite sides of the row gang halves and rearwardly thereof. The support bars are pivotally mounted, "each being swingable about an axis extending normally transverse to the crop row". (Col. 1, lines 50-52). Mr. Whitesides equated the functional floating movement of the rear gangs and the row gangs and the structures used to mount them to the tool bar frame. He described the mounting of the rear gangs to the tool bar frame pointing out (Col. 3, lines 44-49) that:

> "Clevis assembly 22 is constructed so that the tool support bar 21 is *pivotal at its forward end around an axis*

> *which is transverse to the direction of forward movement of the cultivator along the crop rows,* which causes the rotary hoe gang 31 (i.e., rear gang) and plow assembly 44 to be swingable about the transverse axis.*

with the effect that the rear gangs

> ". . . will be urged into the soil without regard to high spots or low spots in the ground along the crop rows." (i.e., free floating) (Col. 3, lines 60-62)

He then states (Col. 3, lines 63-66) that

> "*In a similar manner* each rotary hoe gang 60 (i.e., row gang) of the support leg assemblies 45 and 46 of each section 13a-13d of the cultivator is pivotal about a clevis assembly 53"*

This "similar manner" of mounting the row gang

> ". . . provides independent suspension for each rotary hoe gang 60 so that *each of these rotary hoe gangs will be urged into and till the soil of the crop rows without regard to high spots and low spots along the crop rows.*" (i.e., free floating) (Col. 4, lines 9-13)*

11.07 The clamps 38 employed in both models of the 400 Series KMC Cultivator to attach the pair of rear gangs to their respective support bars permits the rear gangs to be angularly adjusted or tilted so that:

> "the overall arrangement is such that the rotary hoes of a rotary hoe gang 31 (rear gang) can be positioned in various positions with respect to the support bar to cultivate sloped surfaces of the crop row, to be positioned on one side or the other side of the support bar, or to be angled so as to expel dirt to either side of the support bar." (Col. 2, lines 64-67 and Col. 3, lines 1-2)

11.08 Mr. Moore testified that he was familiar with the Kelley 400 Series KMC Cultivator and had observed its opera-

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* Emphasis added.

* Emphasis added.

* Emphasis added.

tion. He testified that the KMC Kelley Cultivator (DX 22-237) performs the same function, and achieves the same result in the same way as the Lehman cultivator disclosed and claimed in the claims of the '271 reissue patent in issue. Mr. Moore worked extensively with the Kelley Series 400 KMC Cultivator in the field and testified that the Kelley Cultivator "can be adjusted to operate to perform the same results that we get with *Lehman*". (Tr. 999-1003) His testimony was corroborated with reference to an actual Kelley cultivator (DX 24-222) and the motion picture (DX 30-201) which showed the performance likenesses between the Lilliston-Lehman Cultivator and the Kelley Cultivator in actual field operation in cultivating row crops such as soybean, corn and cotton in a "once-over all-over" operation.

B. All Elements of the Claims At Issue Are Found In The Kelley 400 Series KMC Cultivator

11.09 Upon reviewing a color-coded correlation between Figures 10, 16 and 17 of the '271 reissue patent (DX 45-205, 46-207), the claim elements in issue of the '271 reissue patent (DX 47-208, 48-209, 49-210, 50-211, 51-212), elements of the 400 Series Kelley Cultivator as shown in DX-22-237 and the testimony of Mr. Dalbert Shefte, Lilliston's patent expert, it is concluded that all of the elements in the claims at issue are found in the 400 Series KMC Cultivator. (Tr. 1306-1313)

C. Kelley 400 Series KMC Cultivator Is Functional Equivalent of The Original Lehman Or The Lilliston-Lehman Cultivator

11.10 Kelley makes no claims that its cultivator is *not* the functional equivalent of the Lehman or the Lilliston-Lehman. Kelley's Vice-President, Mr. Whitesides, swore that the Kelley cultivator will do everything the Lilliston machine will do and

more. (Tr. 1648-9 and see DX 91-73, p. 6 compared to DX 139-175, p. C).

11.11 The motion pictures (DX 30-201) prove the functional equivalence between the Kelley cultivator and the Lehman or the Lilliston-Lehman cultivator.

11.12 The Lehman cultivator implement and the Kelley cultivator are functionally equivalent. The Kelley cultivator is capable of being adjusted to perform the same "once-over all-over" cultivation obtained with the Lehman cultivator covered by the claims in the '271 reissue patent in issue. (Tr. 1000-03, Tr. 1301-1313, Tr. 1354)

11.13 Plaintiff Kelley offered no visual or other tangible evidence to support its contention of non-infringement. It did not call upon Mr. Whitfield or Mr. Whitesides or anyone else familar with normal field use of the Kelley cultivator and its operation to rebut Lilliston's claim of functional equivalence between the Kelley cultivator and the claims of the '271 reissue patent at issue. Kelley's contention instead was promoted *solely* by Dr. Clark whose experience with the Kelley cultivator was limited to a brief exposure in 1974 under pre-arranged, ex parte, unusual conditions. (Tr. 243)

D. The Row Gang Mounting Arrangement Used By Kelley Is The Functional Equivalent Of The "Free-Floating" Row Gang Mounting Claimed In the '271 Reissue Patent

11.16 The function of the row gang mounting arrangement described in the '271 reissue patent is to provide the row gangs with a free-floating action so that the row gangs can conform or follow the varying contour of the ground in the crop rows during cultivation. (DX 1-2, Col. 1, lines 59-62).

11.17 On the earlier model of the 400 Series KMC Cultivator manufactured prior to 1973, the support leg assemblies (identified at 45 and 46 in Whitesides Patent No. '123) to

which were attached the row gangs were respectively mounted directly to the rear gang support bar assemblies (15 and 16 in the '123 patent). This mounting arrangement also permitted the row gangs to "free-float" or swing about a transverse axis to conform to the contour of the crop row during the operation of the cultivator.

11.18 The "free-floating" action is achieved by the row gangs used in the current model 400 Series KMC Cultivator (manufactured in 1973 and later) by the mounting arrangement shown in the photograph of the Kelley Cultivator. (DX 22-237A). Each row gang half is mounted on its support leg (52) which is pivotally mounted to vertical leg (50). As the row gang is moved in rotatable engagement with the crop row the support leg (52) functions to provide the "free-floating" action of the row gang achieved by the Lehman cultivator and the earlier 400 Series KMC Cultivator model in the same manner by vertically swinging to effect the same result of conforming to the contour of the crop row. (DX 30-201, DX 32-225, Tr. 1009-10, 1097-1112, 1357).

11.19 This is further supported by Mr. Whitesides, the designer of the Kelley cultivator, wherein he testified that the rotary hoe gangs were designed to float to follow variations in the terrain (Tr. 1614); and by his '123 patent (DX 10-100) as pointed out above in Findings 11.05 and 11.6.

11.20 The exaggerated downward radial movement of the rotary hoe halves described by Dr. Clark, would *not* be effected to occur if the Kelley row gang suspension arrangement were adjusted in accordance with the Kelley Owner's Manual (DX 8-321, p. 2) used in adjusting the 400 Series KMC Cultivator. (Tr. 326-329). In addition, Mr. Whitesides testified that the radial movement would make no difference. (Tr. 1676)

11.21 Although the mounting of the row gang is described in the claims of the '271 reissue patent at issue such that the row gang of rotary hoes swings "about a transverse axis to rotatably engage a row of crops during forward movement"

of the cultivator, there was no compulsion to word the claim in this manner. Form is not the essence of the invention of the '271 reissue patent.

11.22 Mr. Shefte disagreed with Mr. Nolan's attempt to invoke a file wrapper estoppel with respect to the term "transverse", pointing out (Tr. 1362-1366) that the portion of the file history referred to by Mr. Nolan was directed to a rocking action in relation to the *rear gangs* that had *no* relation to the use of transverse axis in defining the entirely different floating action of the *row gangs.*

11.23 Accordingly, there is no file wrapper estoppel with respect to the term "transverse".

E. There Is No Basis For Limiting The Term "Rotary Hoe" Or Front Row Gang

11.24 The patent in suit (DX 1-2) clearly describes a rotary hoe and the meaning of a gang of rotary hoes as noted above in Findings 9.07 and 9.08.

11.25 There is no basis to limit the ordinary meaning of "rotary hoe"; to limit the front gang, or either of the rear gangs to a one piece or one axle gang. Consequently, the recitation of same covers not only the particular embodiments illustrated in the Lehman patent, but also equivalents thereof. (Tr. 1112-1122)

12.02 The farmer may readily following the patent in suit and exercise judgment to make any adjustments necessary for a given crop and under a given set of field conditions to obtain the desired "once-over all-over" cultivation.

12.03 The U. S. Patent and Trademark Office did not raise any issue of indefiniteness of the claims during the prosecution of the '387 patent or the '271 reissue patent. Neither did Judge Garza in the Caldwell decision find any indefiniteness of the claims.

12.05 The usual presumption of validity of a patent provided by 35 U. S. C. § 282 is strengthened by the decision in *Lilliston Implement Co.* v. *E. L. Caldwell & Sons, Inc.*, 212 F. Supp. 413 (S. D. Tex. 1962). In finding the Lehman patent valid, Judge Garza in the *Caldwell* decision held:

> "The Defendant also claims that there is lack of invention and novelty in the patent in suit. With this, this Court cannot agree. . . . The cultivator patented by the Lehman is one that has revolutionized the cultivation of growing crops." 212 F. Supp., at 419.

12.06 The validity of the Lehman patent is further reinforced by the subsequent granting by the U. S. Patent Office of a reissue patent on December 10, 1974.

12.07 The prior art before the Court in the *Caldwell* case as set forth in the § 282 Notice filed by defendant Caldwell in that action (See DX150-226) is listed in the following table I. As this Court found in its Opinion denying plaintiff's motion for summary judgment:

> "In a prior patent infringement action involving the very patent with which this court is concerned, Lilliston Implement Company et al. v. E. L. Caldwell and Sons, Inc., 212 F. Supp. 413, 136 USPQ 543 (S. D. Tex. 1962), Judge Reynaldo Garza held the patent valid and infringed, and recognized that the patent involved an invention in a very highly developed and crowded field of art. 212 F. Supp. at 419, 136 USPQ at 547-548. In that case the defendant cited more than eighty prior art patents and publications, relying mainly on one patent at trial. While plaintiff here would distinguish the case on the ground that the court viewed closely only one prior art patent, it would seem more logical that the court reviewed all the patents and publications cited to it in considering the validity of the patent." 180 U. S. P. Q. at 372.

I. References Before Caldwell Court
Per Caldwell § 282 Notice

A. ". . . the art of record in the five Lehman et al. application files . . ."

305,613	941,252	1,655,737	2,232,552	2,592,423
360,614	941,740	1,719,292	2,271,713	2,595,637
415,113	949,218	1,827,708	2,294,205	2,650,460
542,339	1,033,330	1,879,785	2,294,470	2,663,131
553,100	1,117,728	1,967,493	2,335,156	2,689,514
617,786	1,329,598	2,034,229	2,483,649	2,707,909
629,727	1,463,353	2,100,499	2,539,632	2,729,929
675,968	1,542,733	2,154,840	2,547,479	2,762,285
897,057	1,559,309	2,191,537	2,569,464	2,880,813

German Patent 728,199

B. ". . . prior art requested of Plaintiff by Interrogatories of July 6, 1962 . . ."

German	35,027	British	825,418
German	176,666	French	1,104,111
German	281,919	French	1,202,274
German	377,956	U. S. A.	1,132,152
German	480,060	U. S. A.	1,289,664
German	543,246	U. S. A.	1,655,737
British	809,155	U. S. A.	1,718,510

U. S. A. 1,908,110

C. "PATENTS"

U. S.	231,582	U. S.	1,249,008
U. S.	529,457	U. S.	1,642,261
U. S.	957,722	U. S.	1,908,110
U. S.	1,135,508	U. S.	2,308,575

D. "PUBLICATIONS"

A Progress Report on ROTARY HOE USE IN TOBACCO, by Robert W. Wilson, January 1951, Information Circular No. 5, Department of Agricultural Engineering, N. C. Agricultural Experiment Station

ROTARY HOES, by Dale O. Hull, Pamphlet 226, May 1956, Agricultural Extension Service-Iowa State College, Ames, Iowa

LINE-DIAGRAM METHOD for the SETTING OF FARM IMPLEMENTS, by William E. Meek and Battle B. Ewing, Circular 138, February, 1948, Mississippi State College, Agricultural Experiment Station, State College, Miss.

Sears Roebuck and Co. Catalog, Spring 1929, pages 880, 881, 882, 883. Obtainable at Library of Congress as Book Number TS 199.843

Sears Roebuck and Co. Catalog, Spring 1928, page C887

A MACHINE FOR USE IN EVALUATING AGRICULTURAL FIELD TOOLS, by Edwin James Matthews, University of Arkansas, 1955, entire thesis and movie

PRINCIPLES OF FARM MACHINERY, by Bainer, Kepner & Barger, John Wiley & Sons, Inc., 2nd printing, copyright 1955, pages 197 to 211 and 257 to 281

AGRICULTURAL ENGINEERING, October 1949, "Cultivation & Weed Control of Cotton", by E. N. Scarborough, page 491

METHODS AND TOOLS FOR TOBACCO CULTIVATION, Bulletin 397, March 1956, Agricultural Experiment Station, North Carolina State College, Raleigh, N. C.

MACHINERY FOR FARM, RANCH & PLANTATION, by Arthur W. Turner, E. J. Turner, McGraw Hill Publishing Co., 3rd printing, copyright 1948, pages 258 to 288 (Phillips' deposition)

FARM MACHINERY & EQUIPMENT, by Harris Pearson Smith, McGraw Hill Publishing Co., 4th edition, copyright 1955, pages 231 to 249; also 3rd edition, chapter on cultivators, 1948

MECHANICAL PRODUCTION OF COTTON in the YAZOO-MISSISSIPPI DELTA, by Adams & Gull, reprint T. T. -11-46, American Potash Institute, Inc. (Phillips' deposition)

12.08 This Court ordered plaintiff to specify, with respect to all items of prior art on which plaintiff intends to rely:

> ". . . the manner in which any such items of prior art is materially distinguishable from those considered in reaching prior decisions of patent validity and patentability." (Court's Order of August 25, 1977)

No such distinctions have been pointed out by plaintiff.

C. The '271 Reissue Patent Meets The Conditions Of Patentability Imposed By The Court and the Statutes (35 USC 101, 102, 103)

12.09 Plaintiff has the burden to show that the novelty, usefulness, and non-obviousness tests established by the provisions of 35 U. S. C. §§ 101, 102 and 103 to determine the question of patentability have not been met. [See *Graham* v. *John Deere*, 383 U. S. 1, (1966)].

12.10 Plaintiff does not question the utility of the '271 reissue patent. The '271 reissue patent meets the test of usefulness under § 101.

12.17 The "more than 80 prior art patents and publications" cited by the defendant in the *Caldwell* litigation (212 F. Supp., at 419) illustrate the high degree of patent activity in this and related art. Although the patent activity was significant, no equipment was commercially available which provided a cultivator to the farmer for "once-over all-over" cultivation. (Tr. 1545-50)

12.18 The references upon which plaintiff relies to allegedly show the elements and concepts of the '271 reissue patent are as follows:

Braun 1,908,110 (PX 10-91)
Remy French 1,104,111 (PX 12-115 & PX 13-116)
Walker 2,227,772 (PX 27-112)
Burns 2,243,241 (PX 55-233)
Ogden 675,968 (PX 11-87)
Maul 529,457 (PX 14-143)
Charley 2,655,083 (PX 41-326)
Newton 1,681,464 (PX 39-325)
Friend 2,579,5561 (PX 40-324)
Benjamin 1,760,336 (PX 33-95)
Christensen et al. 1,043,202 (PX 49-140)
Christofferson 949,218 (PX 48-89)

Burns (PX 55-233) and Christensen (PX 49-140) were relied upon by plaintiff to merely show the state of the art. (Plaintiff's pre-trial 35 USC 282 Amended Notice) The Charley (PX 41-326), Newton (PX 39-329) and Friend (PX 40-324) references were brought to defendant's attention by plaintiff on the eve of the trial.

12.19 With the exception of the Burns and Christensen "state of the art" references and the newly cited Charley, Newton and Friend references, the remainder of the references have already been considered in reaching prior decisions of the patent validity and patentability in either the *Caldwell* case (See DX 150-226) or before the Patent Office on the reissue application. (DX53-3, pgs. 50-62 and 139) There are no material distinctions between these references and the prior art already considered in the *Caldwell* case or in the reissue application.

b. There Are Patentable Differences Between the Prior Art and the Claims in Issue

12.20 Walker's radial blades (PX 27-112) would cause crop destruction of run in contact with the crop. (Tr. 1588-89)

There is no disclosure in Walker which teaches the substitution of a rotary hoe gang for the radial blades used as choppers by Walker. Charley (PX 41-326) does not suggest such a substitution. The cooperative effect of the row gangs of rotary hoes and pairs of rear gangs of rotary hoes is only taught by the '271 reissue patent and not by the prior art.

12.21 Ogden (PX 11-87) does not teach any cooperative effect to be achieved between a front cultivator element and a rearwardly mounted pair of rotary hoes. Remy (PX 12-115) does not disclose rotary hoes nor does it disclose any cooperative effect. Maul (PX 14-143) is similar to Ogden in showing a single set of gangs of spading teeth. Maul merely shows a single pair of gangs of spading teeth angularly adjustable in the manner of a conventional disc cultivator for moving dirt to and from the row of crops under cultivation.

12.22 Combining Maul (PX 14-143) and Christoffersen (PX 48-89) and Ogden (PX 11-87) could only be made by hindsight using the '271 reissue patent as part of the prior art. The suggested references which show only single sets of cultivating tools do not teach or even suggest the invention embodied in the claims of issue. The same finding is reached for plaintiff's suggested combination of Burns (PX 55-233) or Friend (PX 40-324) and Maul (PX 14-143) and Christoffersen (PX 48-89).

12.23 No cooperative effect is taught for the cultivator shovels used on Newton's cultivator attachment (PX 39-325) which permits the lateral adjustment of the shovels while in the ground in order to enable the shovels to align with irregularities in the rows.

12.25 Neither Braun (PX10-91) nor Remy (PX12-115) teaches the "once-over all-over" concept achieved by the Lehmans.

12.34 While the Lehman invention comprised a combination of known elements, the combination achieved an unusual,

unexpected, new and desirable "once-over all-over" cultivation effect. This fulfills any requirement of "synergism" injected by the Supreme Court in *Sakraida* v. *Ag Pro, Inc.*, 429 U. S. 273 (1976) and *Anderson's Black Rock* v. *Pavement Salvage Co.*, U. S. 57 (1969).

XIII PLAINTIFF'S MISCELLANEOUS CONTENTIONS OF FRAUD, INEQUITABLE CONDUCT, MISUSE AND INTERVENING RIGHTS

13.01 Allegations of fraud and inequitable conduct must be established by clear, unequivocal and convincing evidence.

13.02 Not only has plaintiff failed to meet its burden, but its allegations that defendant committed fraud on the Patent Office in prosecuting the '387 patent and inequitable conduct in prosecuting the '271 reissue patent are unfounded.

13.03 All of the 23 references which plaintiff alleges were not brought to the attention of the Patent Office in the prosecution of the '387 patent were brought to the attention of the Patent Office by defendant during prosecution of the '271 reissue patent (DX53-3, pages 117-120)

13.04 Plaintiff has failed to show any intentional withholding, bad faith, gross negligence or reckless disregard of the duty of frankness on the part of defendant in connection with these references and the '387 patent.

13.05 Plaintiff attaches special importance to three of these references, Farnham, Waterman and Hipple. The Farnham Patent (PX34-113) was before the Court in the *Caldwell* action. The Waterman Patent (PX37-135) was known to the defendant Caldwell but was discarded and was not relied on by Caldwell at the trial. (DX150-226)

13.06 The Waterman, Farnham and Hipple Patents are not materially distinguishable from and are merely cumulative of the prior art considered by the U. S. Patent Office during prosecution of the '387 patent. This is evidenced by the reissue of

the '387 patent as the '271 reissue patent by the Patent Office after its consideration of these references. (DX53-3, pages 117-120 and 139)

13.07 Kelley fails to show the materiality of any of these references. Kelley attaches so little significance to the Farnham, Waterman and Hipple Patents that it fails to even rely on them for invalidity.

13.08 Kelley had knowledge of the Lehman reissue application. Defendant agreed to allow Kelley access to the application file and proceedings during prosecution; and, in fact, defendant furnished Kelley with copies of all documents submitted to and received from the Patent Office. Although Kelley had the opportunity, it chose not to participate and did not submit any prior art references or attempt to explain defendant's "interpretation of the claims." It cannot now be heard to complain that defendant brought over 270 items of prior art to the attention of the Patent Office in the prosecution of the '271 reissue or that defendant didn't explain its "claim interpretation." (DX53-3)

13.09 Plaintiff's allegation that the date on which the supposed defect in the '387 patent was discovered was misrepresented to the Patent Office is not supported by the record. Nowhere in the letter from Kelley's counsel to Lilliston's counsel (PX73-275) is notice of the defect made clear to a reasonable person. The affidavit filed in Support of the Declaration (DX 53-3, pages 125-126) clearly sets forth the manner in which the alleged defect was discovered. There is no showing of any intentional misrepresentation, bad faith, gross negligence or reckless disregard of counsels duty. Kelley remained silent throughout the reissue proceedings and now cannot be heard to complain.

13.10 Defendant was lawfully exercising its patent rights in its prior infringement suits against Caldwell, Deere and International Harvester.

13.11 Plaintiff has failed to establish that defendant has engaged in activity which amounts to patent misuse.

13.12 No cultivator capable of achieving "once-over all-over" cultivation in accordance with the patent in suit was on sale or in use more than one year prior to the effective filing date of the '387 patent. [See Findings 5.07-5.09]

80-141

Supreme Court, U.S.
FILED
JUL 28 1980
MICHAEL RODAK, JR., CLERK

No.

In the
Supreme Court of the United States
OCTOBER TERM, 1979

Kelley Manufacturing Company,

Petitioner,

vs.

Lilliston Corporation,

Respondent.

On Writ of Certeriori to the United States Court of Appeals for the Fourth Circuit.

SUPPLEMENTAL APPENDIX TO PETITION FOR WRIT OF CERTIORARI

JAMES M. WETZEL
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312/236-8500
Counsel for Petitioner

Of Counsel:
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The Scheffer Press, Inc.—(312) 263-6850

SUPPLEMENTAL APPENDIX TO PETITION FOR WRIT OF CERTIORARI

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Maul Patent No. 529,457 November 20, 1894 for "Cultivator" SA18

Braun Patent No. 1,908,110 May 9, 1933 for "Rotary Hoe Attachment for Cultivators" SA24

Dec. 10, 1974 C. L. LEHMAN ET AL Re. 28, 271

CULTIVATOR

Original Filed June 12, 1961 9 Sheets-Sheet 1

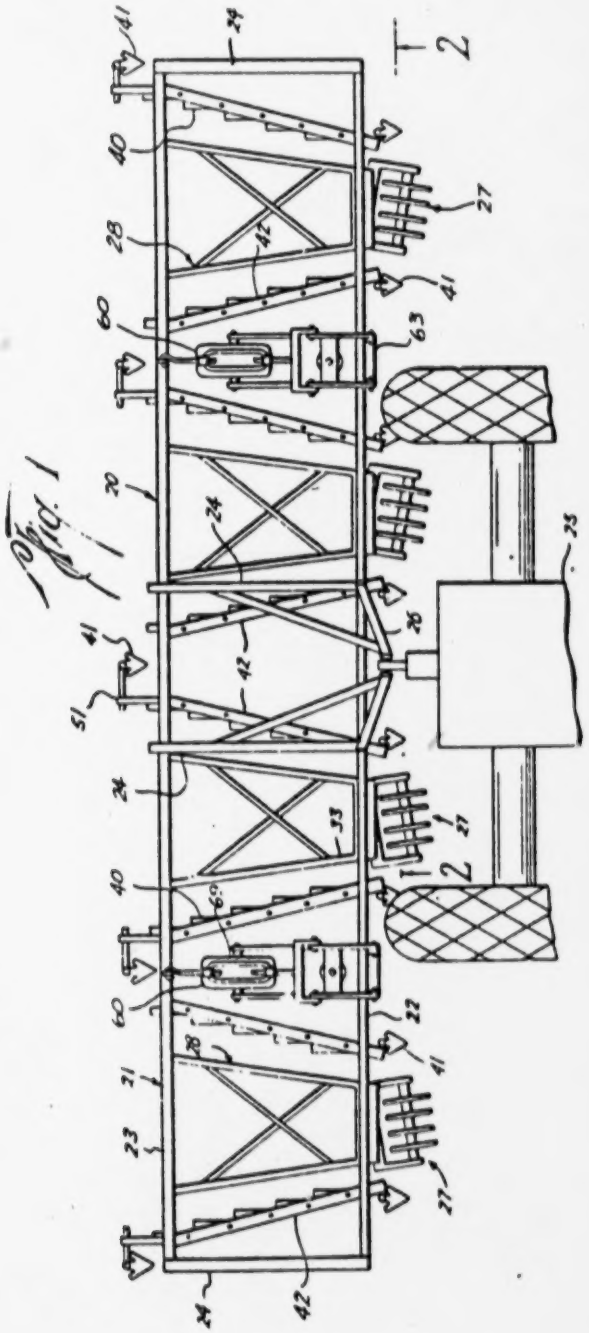

Fig. 1

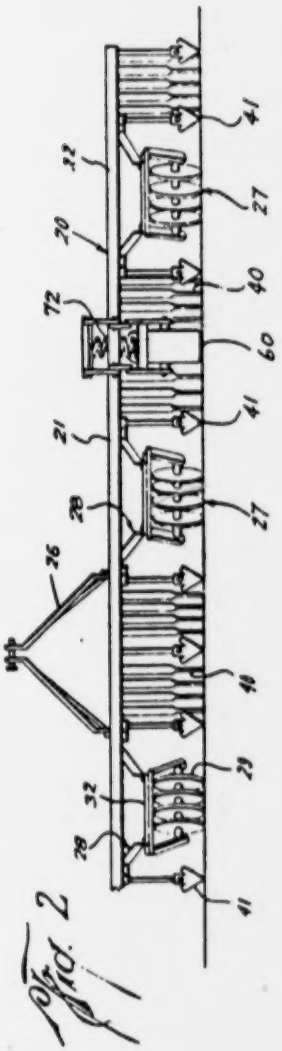

Fig. 2

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Fig. 3

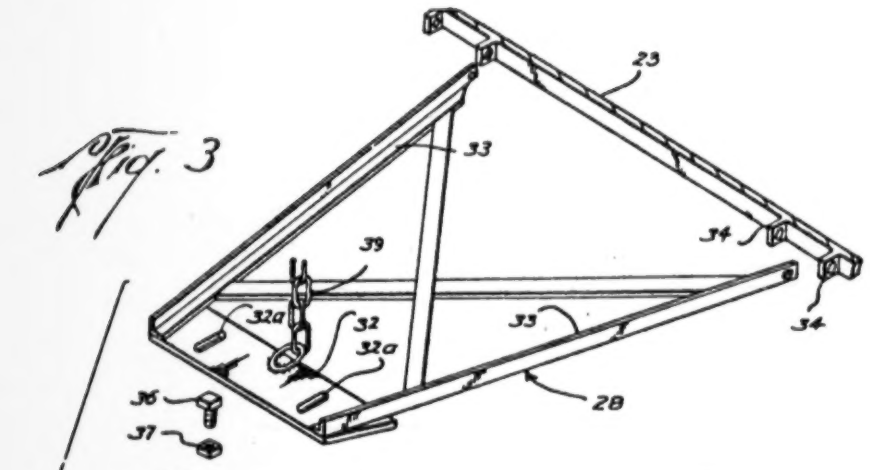

Fig. 4

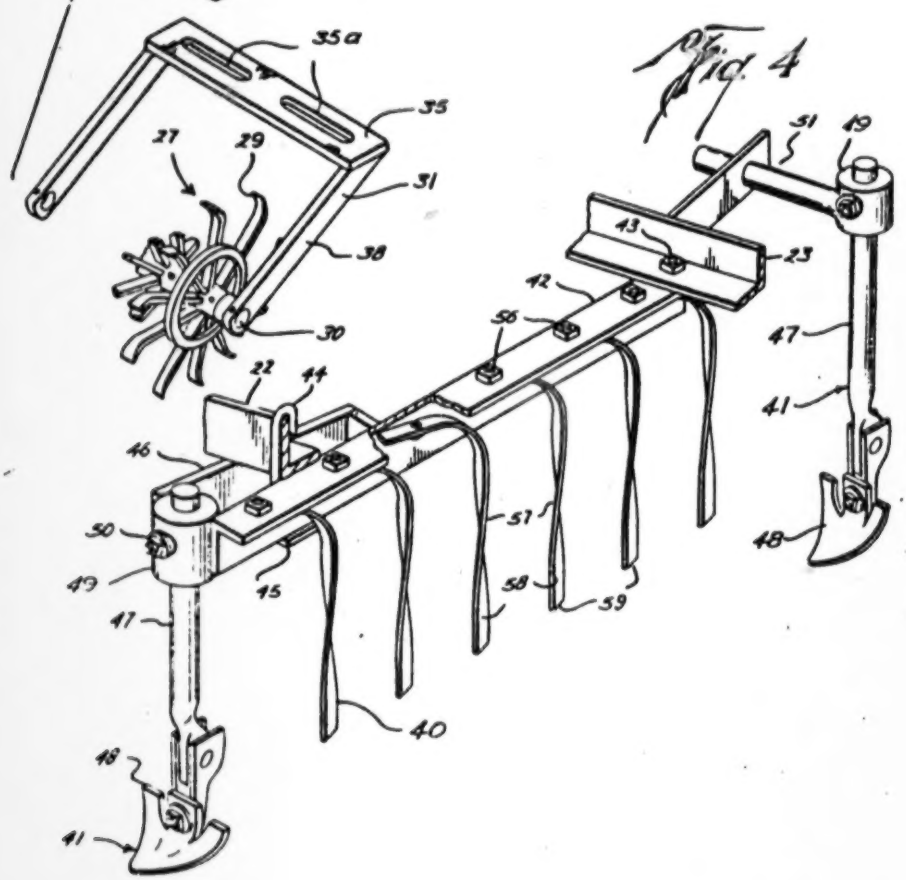

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Fig. 6

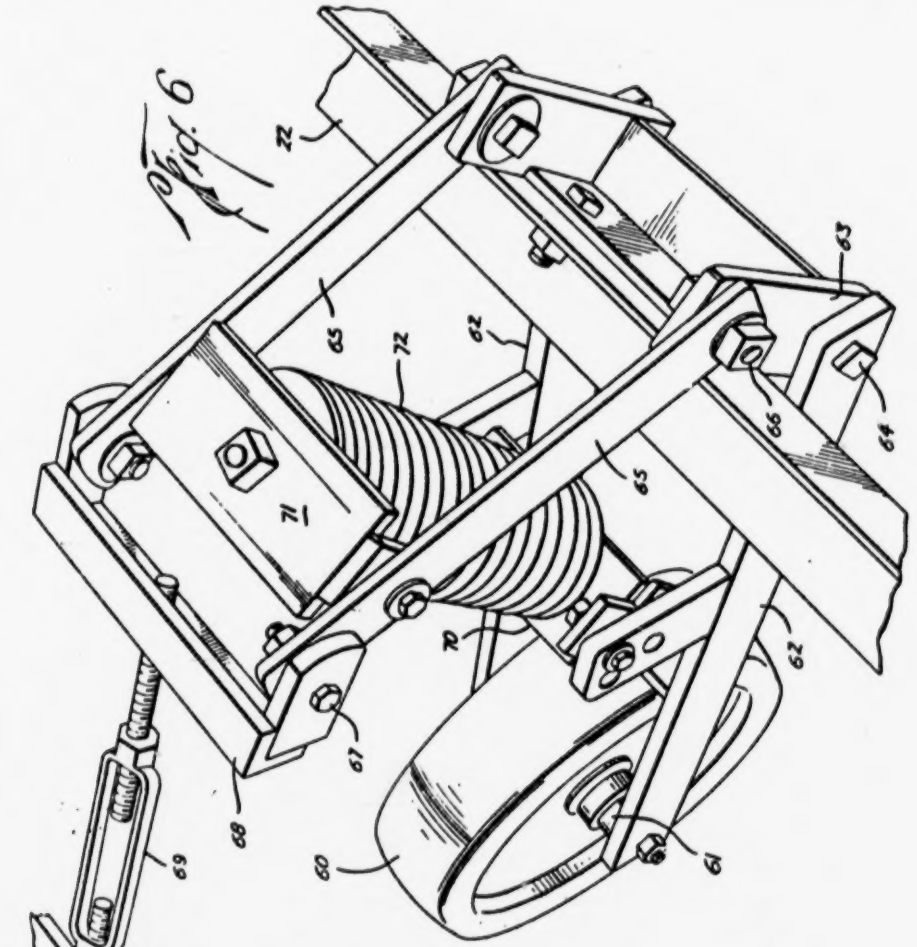
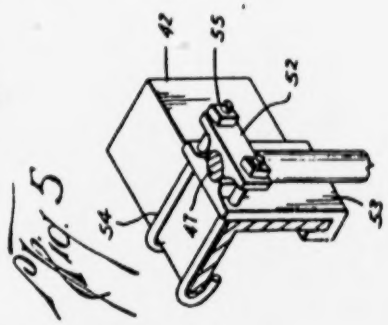


Fig. 5



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CULTIVATOR

Original Filed June 12, 1961 9 Sheets-Sheet 4

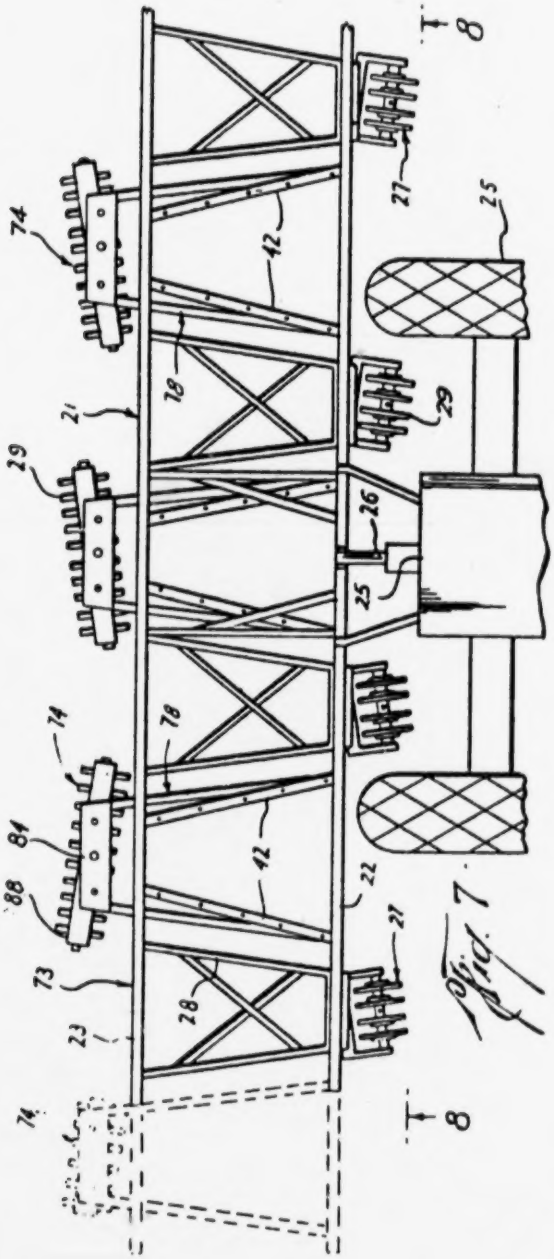

Fig. 7

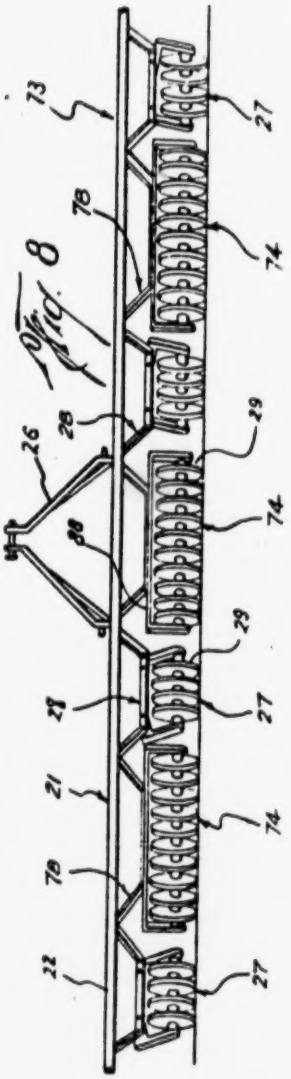

Fig. 8

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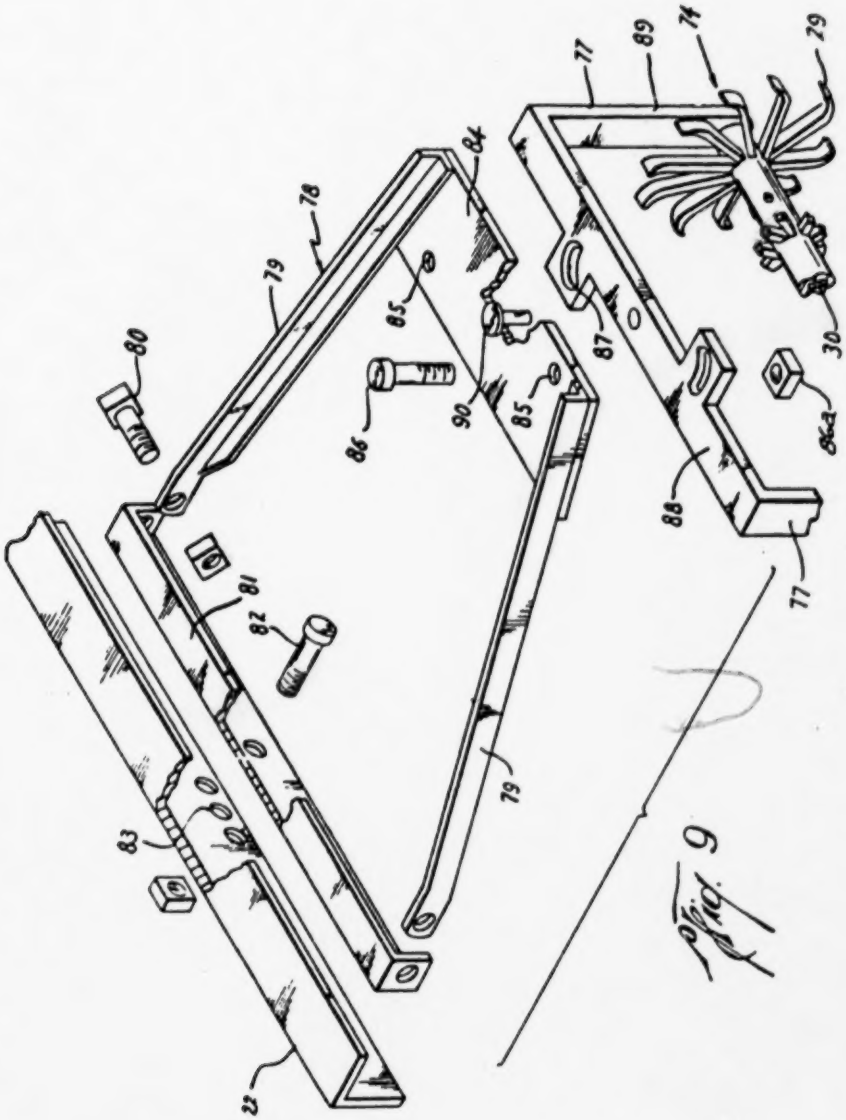

Fig. 9

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Fig. 10

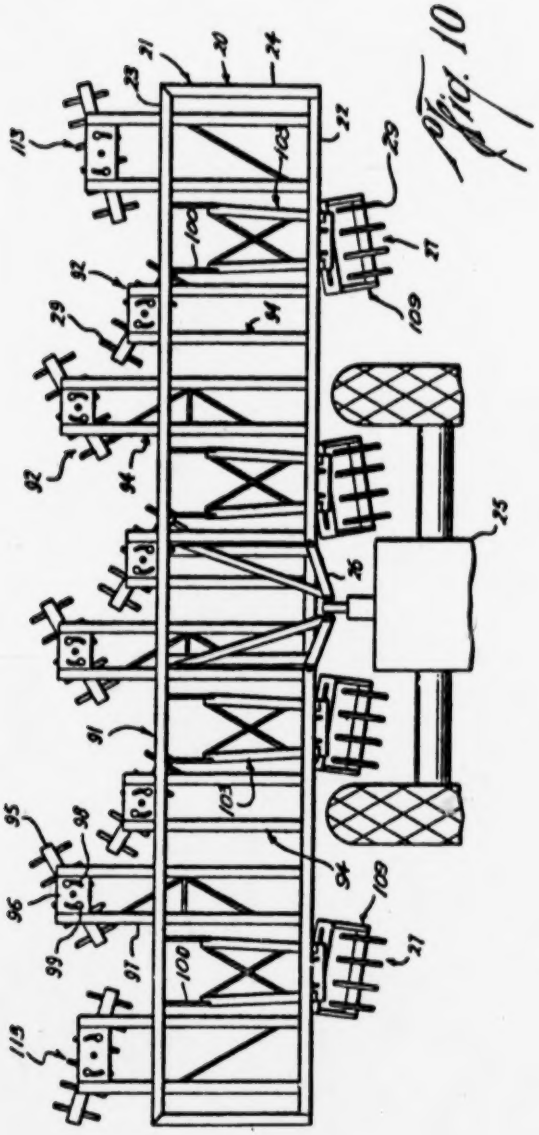
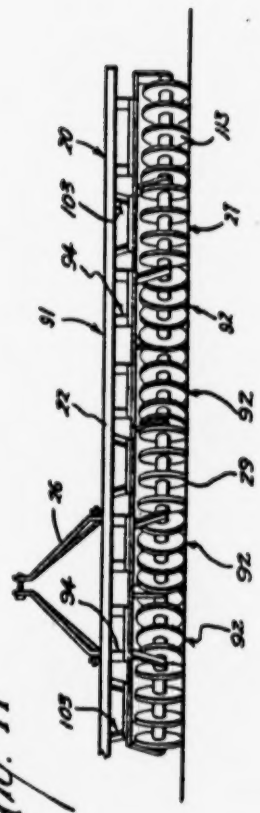


Fig. 11



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CULTIVATOR

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Fig. 12

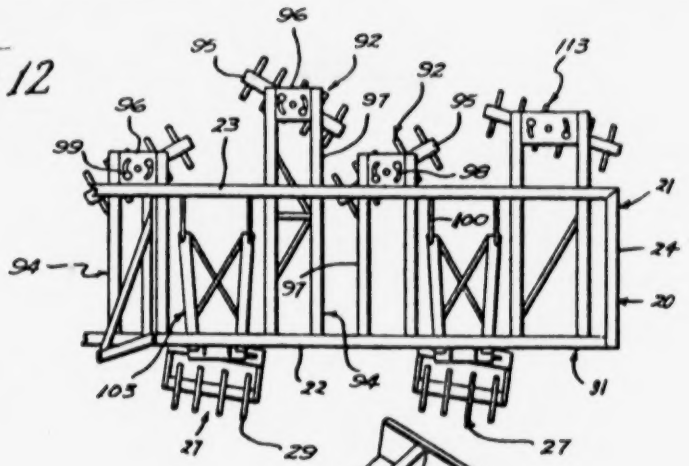
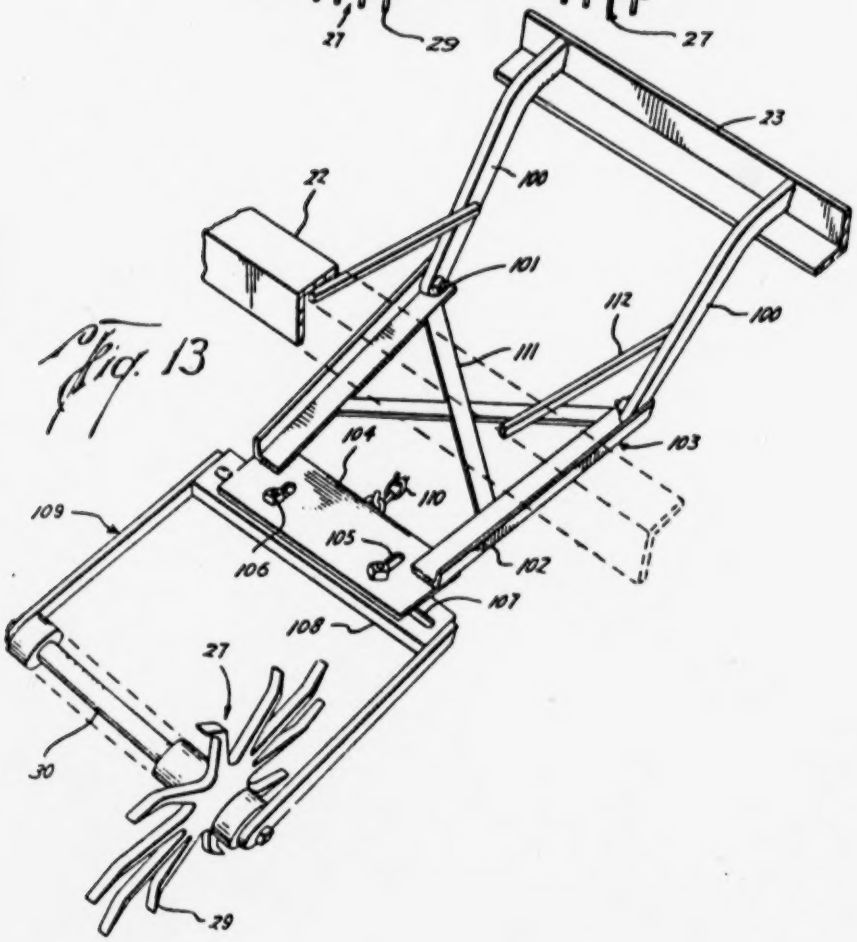


Fig. 13



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CULTIVATOR

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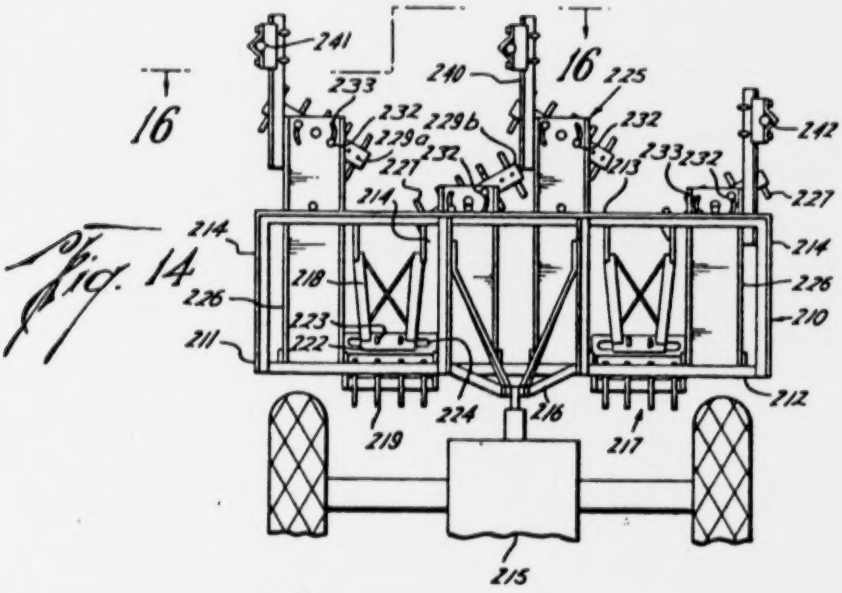

Fig. 14

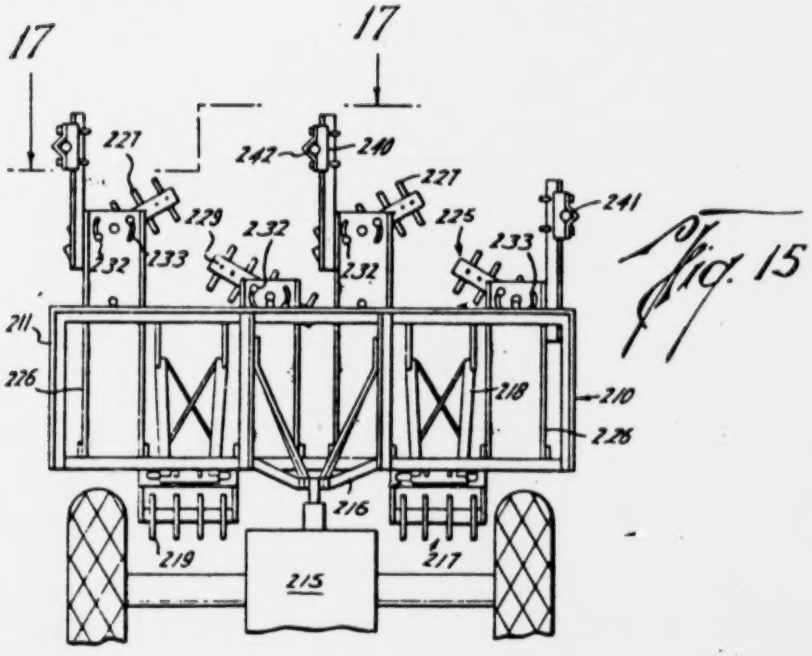

Fig. 15

Dec. 10, 1974 C. L. LEHMAN ET AL Re. 28, 271

CULTIVATOR

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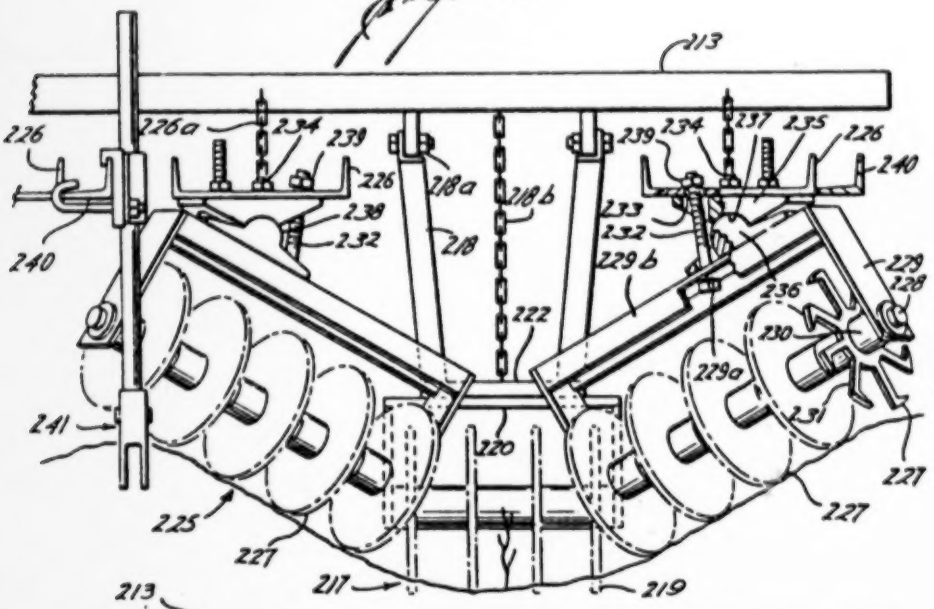
Fig. 16



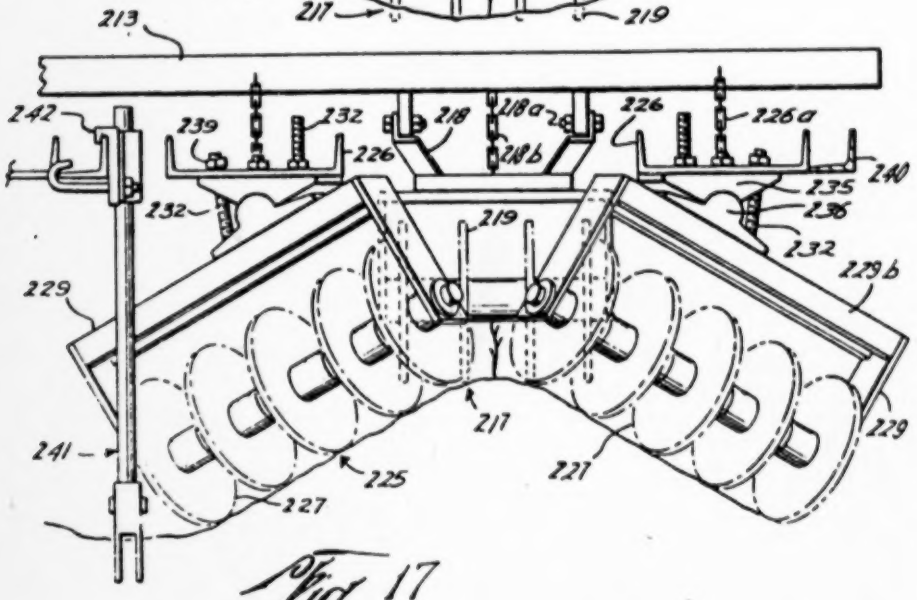


Fig. 17

United States Patent Office

Re. 28,271
Reissued Dec. 10, 1974

28,271
CULTIVATOR

Charles L. Lehman and Alvin H. Lehman, Corpus Christi, Tex., assignors to Lehman Equipment Company, Nueces County, Tex.

Original No. 2,994,387, dated Aug. 1, 1961, Ser. No. 113,993, June 12, 1961, which is a continuation-in-part of application Ser. No. 800,304, Mar. 18, 1959, and Ser. No. 54,468, Sept. 7, 1960. Application Ser. No. 800,304 being a continuation-in-part of applications Ser. Nos. 725,640 and 725,641, both filed Apr. 1, 1958, all now abandoned. Application for reissue Sept. 21, 1973, Ser. No. 396,661

Int. Cl. A01b *5/06*

U.S. Cl. 172—587 26 Claims

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This invention relates to apparatus for cultivating row crops, and, more particularly, to a rotary cultivator.

This application is a continuation-in-part of our copending applications, Ser. No. 800,304, filed Mar. 18, 1959, and entitled, "Cultivator," now abandoned, *which is a continuation-in-part of each of our copending applications, Ser. Nos. 725,640 and 725,641, filed Apr. 1, 1958, and entitled "Rocking, Vertically Movable Cultivating Device" and "Cultivating Mechanism," respectively, each now abandoned,* and Ser. No. 54,468, filed Sept. 7, 1960, and entitled "Cultivator," now abandoned.

In a conventional rotary cultivator, rotary hoes are fixedly secured across the width of a frame in multiple rows so that, as the frame is moved forwardly, the ends of the legs of each hoe successively penetrate the ground to break up its upper crust. If, however, the ground is not level, the crops from the high rows may be pulled up due to the concentrated weight of the hoes imposed upon them, while the low rows may not even be touched by the hoes. Still further difficulty is encountered when the crops to be cultivated are planted either high on a row or deep in a row.

Ordinarily, weeds are rooted only in the surface crust of the ground above the more deep-rooted crops such that they may be pulled up by the rotary hoes without damage to the crops themselves. When the crops are high, it is desirable to kill off the chopped weeds by covering them with dirt from between the rows. It may also be desirable to build up the row in order to facilitate operation of a mechanical picker or the like. On the other hand, when the crops are low, caution should be taken to see that they are not covered by dirt from between the rows.

An object of this invention is to provide a rotary cultivator having separate gangs of "free-floating" rotary hoes which will engage the row crops with a greater force than heretofore possible with cultivators having conventional free-floating gangs of hoes.

Another object is to provide a rotary cultivator having separate gangs of free-floating rotary hoes which are individually free to conform to the contour of the row each engages.

A further object is to provide a rotary cultivator having separate gangs of free-floating rotary hoes whose ground turning action may be regulated by their angular adjustment with respect to the row crops without a substantial change in their tracking pattern.

Still another object is to provide a rotary cultivator having rotary hoes which will uniformly engage the row crops as well as the ground between the rows regardless of the contour thereof and which will permit the weeds

to be pulled from the row crops and covered with dirt turned from between the rows.

A still further object to provide a rotary cultivator of the type above described in which the rotary hoes are mounted with respect to one another in a compact arrangement which, at the same time, enables them to engage the ground with maximum leverage.

Yet another object is to provide such a rotary cultivator which is readily adjustable in a manner to prevent dirt from between the rows being turned onto the crops.

Another object is to provide a cultivator which is readily adjustable for use in cultivating different widths of rows, or even double row crops, as well as in turning a greater or lesser amount of dirt onto the rows.

Still another object is to provide a cultivator in which the cultivating elements thereof are selectively interchangeable with one another to turn dirt from between the rows in either of two directions.

Still a further object is to provide a cultivator having a vehicular frame for supporting the cultivating elements in a manner to permit the force with which such elements engage the ground to be adjusted to a desired amount

A still further object of this invention is to provide an improved cultivator of the type above described in which the ground intermediate either high or deep planted crops may be turned either toward or away from the crops.

Yet another object is to enable the above-described cultivator to be converted for such use with a minimum of time and expense.

Other objects, advantages and features of this invention will be apparent to one skilled in the art upon a consideration of the written specification, the attached claims and the annexed drawings.

These and other objects are accomplished, in accordance with this invention, by a cultivator which comprises a frame adapted to be moved forwardly over the ground and a plurality of separate gangs which are mounted from the frame for swinging about a transverse axis to rotatably engage spaced-apart rows of crops in a laterally extending row during forward movement of the frame. Each such gang is also swingable about a vertical axis to adjust the angular relation of the path of rotation of the hoes thereof with respect to the rows; and means are carried by the frame for turning the ground intermediate adjacent rows of crops and rearwardly of the engagement therewith of the gangs with the crops.

From the foregoing, it will be apparent that each gang is free-floating so as to conform to the ground levels of the row crops. It will also be apparent that the angular adjustment of each gang enables regulation of the extent with which the weeds are chopped out of the crops.

Each separate gang is pivotally mounted from the frame for swinging about an axis rearwardly of the engagement of the hoes of such gang with the ground. In this manner, the hoes engage the ground with a "pushing" action which causes them to penetrate the ground with a greater force than the conventional "pulled" type of hoes. In one form of the invention, the support for each gang of rotary hoes may be pivotally mounted from the frame for swinging about a longitudinal axis so that each gang is free to rock into conformity with the contour of the row it engages.

More particularly, each such gang of free-floating rotary hoes is carried by a bracket which is connected to a support pivotally mounted on the frame in such a manner that the bracket may be swung about the aforementioned vertical axis without changing the lateral position of the gang. Thus, the degree of chopping action may be regulated without a change in the tracking pattern of the gang of rotary hoes.

In accordance with certain of the forms of the present invention, the aforementioned means for turning the ground intermediate and rearwardly of the engagement of the first-mentioned gangs with adjacent rows of crops comprises additional separate gangs of rotary hoes pivotally mounted on the frame for swinging about a transverse axis similarly to said first-mentioned gangs. Each additional gang is also similarly swingable about a vertical axis to adjust the angular relation of the path of rotation of the hoes of such gang with respect to the forward movement of the frame. Thus, the ground between the rows are also engaged with a uniform force regardless of its contour, and the extent to which such ground is turned onto the crops may be increased or decreased, as desired.

In accordance with a further novel aspect of the invention, these additional gangs of rotary hoes are pivotally mounted on the frame for swinging about a transverse axis forwardly of their engagement with the ground as well as the engagement of the gangs of rotary hoes with the row crops. This combination "pushing" and "pulling" arrangement of the gangs of rotary hoes engageable with the row crops and the ground between the crops, respectively, enables the width of the cultivator from front to back to be kept to a minimum while, at the same time, causing the rotary hoes to engage the ground with a maximum leverage.

In the preferred of the above-mentioned forms, the additional gangs of rotary hoes include a pair of gangs engageable with the ground between adjacent rows. Due to the aforementioned angular adjustment, these pairs of gangs may be swung between positions in which they are rearwardly convergent with respect to one another and in which they are rearwardly divergent with respect to one another for turning the ground onto the row crops and preventing such ground from being so turned, as desired. More particularly, the gangs of each pair are mounted to engage the ground in longitudinally offset and laterally overlapping relation with one another so that all of the ground between the rows will be turned regardless of the angular adjustment of such gangs. Still further means are provided for tilting the gangs of each pair from one side to the other of a level position. Thus, such gangs may be tilted to downwardly convergent positions when the crops to be cultivated are low in a row, and to upwardly convergent positions when such crops are high on a row.

In accordance with another form of the invention, the means for turning the ground between the crops comprises one or more of the conventional flexible teeth or sweeps. One novel aspect of this form of the invention involves the suspension of such cultivating elements from spaced-apart beams which are pivotally mounted on the frame toward their rear ends for swinging about a vertical axis and suspended from the frame at their forward ends for sliding laterally thereof. This enables the cultivating elements to be moved toward or away from the row crops for increasing or decreasing the amount of dirt it turns onto such rows. It also enables the width of the ground to be turned to be narrowed in the event that wider, or even double, rows of crops are to be cultivated.

It is further contemplated that the teeth suspended by such beams may comprise a thin bar having a lower portion angularly disposed with respect to forward movement of the frame so as to turn the ground in one direction and a lower edge tapered to define a forward point for engaging the ground. When it is desired to turn the ground in a different direction, the teeth suspended from one beam may be interchanged with those suspended from the other beam of the pair.

It is still further contemplated that one or more teeth suspended from the beam may be replaced by a sweep suspended from an intermediate portion of the beam in a manner to permit it to be moved longitudinally thereof with a minimum of time and effort.

In accordance with yet another novel aspect of the invention, one or more wheels are mounted on the frame from which cultivating elements are suspended in such a manner as to permit adjustment of the force with which such elements are caused to engage the ground. More particularly, the wheels are pivotally mounted from the frame and urged by a compression spring downwardly against the ground with a force which is readily adjustable by an extendible and retractable device.

In the drawings, wherein like reference characters are used throughout to designate like parts:

FIG. 1 is a plan view of one form of cultivator constructed in accordance with the present invention wherein the ground between the row crops is engaged by sweeps and teeth for turning it onto the adjacent row crops;

FIG. 2 is a front elevational view of the cultivator of FIG. 1, as seen along broken line 2—2 thereof;

FIG. 3 is a perspective exploded view of one of the gangs of rotary hoes of the cultivator of FIGS. 1 and 2, together with the floating support therefor;

FIG. 4 is a perspective view of some of the sweeps and flexible teeth of such cultivator together with the beam supporting same;

FIG. 5 is another perspective view of an alternative construction for supporting a sweep along an intermediate portion of the beam of FIG. 4;

FIG. 6 is a perspective view of one of the wheels supporting the frame of the cultivator of FIGS. 1 and 2;

FIG. 7 is a top plan view of another form of cultivator constructed in accordance with the present invention and wherein the ground between the row crops is engaged by additional gangs of rotary hoes for turning the soil to one or the other of the adjacent row crops;

FIG. 8 is a front elevational view of the cultivator of FIG. 7, as seen along broken line 8—8 thereof;

FIG. 9 is a perspective exploded view of one of the additional gangs of rotary hoes of the cultivator of FIGS. 7 and 8;

FIG. 10 is a top plan view of a still further form of cultivator constructed in accordance with the present invention and wherein the ground between the row crops is engaged by additional rotary hoes arranged in pairs for turning the soil onto the row crops;

FIG. 11 is a front elevational view of part of the cultivator of FIG. 10;

FIG. 12 is a top plan view of part of the cultivator of FIGS. 10 and 11, with the additional gangs of rotary hoes moved to a position for preventing the soil from being turned onto the row crops;

FIG. 13 is a perspective view of one of the gangs of rotary hoes of the cultivator of FIGS. 10 to 12 for engaging the row crops together with a modified floating support therefor;

FIG. 14 is a top plan view of yet another cultivator constructed in accordance with the present invention, and wherein the rear gangs are swung about a substantially vertical axis to positions for turning the ground intermediate the spaced-apart rows of crops engaged by the forward gangs onto such crops;

FIG. 15 is a view similar to FIG. 14, but wherein the rear gangs have been swung to oppositely disposed positions for turning such ground away from the crops;

FIG. 16 is an enlarged rear view of part of the cultivator, as seen along broken line 16—16 of FIG. 14 and showing the rear gangs tilted about horizontal axes to positions for turning such ground onto a deep planted row of crops; and

FIG. 17 is also an enlarged rear view of the cultivator, but seen along broken line 17—17 of FIG. 15 and showing the rear gangs tilted to positions for turning such ground away from a high planted row of crops.

Referring now to the above-described drawings in more detail, the cultivator shown in FIGS. 1 to 4, and designated in its entirety by the reference character 20, comprises a frame 21 having parallel laterally extending front

and rear members 22 and 23 rigidly connected to one another by cross members 24 at opposite ends and along intermediate portions thereof. The frame is adapted to be moved forwardly (to the right in FIG. 1) by means of a tractor 25 connected thereto by a conventional three-point hitch 26 or other suitable means, which may be connected to the intermediate cross members 24.

Separate gangs 27 of rotary hoes are mounted from the frame 21 for swinging about a transverse axis to rotatably engage spaced-apart rows of crops in a laterally extending row during forward movement of the frame. More particularly, and as best shown in FIG. 3, each gang 27 is individually mounted from a support 28 pivotally connected to the rear frame member 23 to engage the row crops forwardly of the pivotal axis of the support. In this manner, the rotary hoes are "pushed" over the row crops so as to engage the ground with greater force than in the customary "pulled" type of hoe.

More particularly, each gang includes a plurality of individual hoes 29 rotatably mounted about a shaft 30 carried by a bracket 31, as best shown in FIG. 3. Each of the brackets is, in turn, connected to a plate 32 of the support 28 which is connected to the forward ends of bars 33 pivotally connected at their rearward ends to lugs 34 on the inner side of the rear frame member 23. As can be seen from FIG. 3, there are spaced-apart pairs of lugs 34 which permit the position of the gangs of rotary hoes to be adjusted in a lateral direction to accommodate different spacing between row crops. At any rate this pivotal support for the gangs enables them to adjust to different elevations of the row crops so that each crop will be engaged by its particular gang of hoes with substantially the same force.

Again as shown in FIG. 3, a plate 35 across the upper end of the bracket 31 is connected to the plate 32 of the support 28 for swinging about a vertical axis. For this purpose, the plate 35 of the bracket is provided with laterally extending slots 35a and the plate 32 is provided with longitudinally extending spaced-apart slots 32a for receiving bolts 36 which may be tightened against opposite sides of the plates by means of nuts 37. In this manner, the hoes of each gang may be swung to a position, as shown in FIGS. 1 and 2, wherein they are angularly disposed with respect to the row crops and the forward movement of the frame. When so disposed, the turned ends of the legs of the hoes will slide through the upper crust of the ground to chop out the weeds without uprooting the crops. As previously mentioned, the extent of such chopping action may be increased by increasing the angular relation of the path of rotation of the hoes with respect to the row crops. Also, the gangs on opposite sides of the center of the frame may be swung into divergent positions, as shown in FIGS. 1 and 2, so as to prevent side draft.

It is preferred that the plate 35 of the bracket 31 be maintained flat with respect to the ground during use in order to prevent one end of the gang from being thrust into the ground when moved forwardly in an angular position. Thus, the plate 32 of the support 28 may be connected to the forwardly and downwardly extending side bars as shown in FIG. 3 to maintain it substantially flat in the average elevational position of the gang.

In the construction shown in FIG. 3, the side legs 38 depending from the plate 35 of the bracket 31 also extend forwardly so as to engage the ground as far forward as possible without interference with the frame during floating of the gangs. As a result of this construction, the tracking relation of the gang with respect to the row crops is changed when the bracket is pivoted about the bolts 36. However, the elongated slots 35a enable the bracket to be moved laterally to compensate for this condition each time the bracket is swung in the manner described. These elongated slots also enable the lateral position of the gangs to be adjusted for accommodating different spacing between row crops.

The forward ends of the support 28 are suspended from the frame by means of chains 39 or the like which may be taken up to lift the gangs off the ground during movement of the equipment to and from a job.

The teeth 40 and sweeps 41 are best shown in FIG. 4 to be suspended from beams 42 mounted on the frame between the front and rear frame members 22 and 23. More particularly, the beams are arranged in rearwardly convergent pairs between the supports 28 for adjacent gangs 27 of rotary hoes as well as on the outside of the end supports. With the teeth and sweeps so arranged on the frame, the ground between the row crops is broken up and turned onto adjacent crops so as to cover up the weeds which have been chopped therefrom.

More particularly, each of the beams 42 is pivotally mounted at its rearward end to the rear frame member 23 by means of a bolt 43 (see FIG. 4). The forward end of each of the beams is suspended from the front frame member 22 by means of a J-bolt 44 having its upper end hooked over the front frame member and a plate 45 on its lower end beneath the forward end of the beam. This J-bolt extends between one side of the beam and a plate 46 secured thereto so that it slides laterally over frame member 22 as the plate 45 slides longitudinally of the beam to permit the forward end of the beam to be swung about the pivot pins. This construction enables the forward ends of adjacent beams to be moved closer together in order to accommodate wider row crops and, in fact, to permit the replacement of the gangs 27 with wider gangs for double rows of crops. On the other hand, the forward ends of the beams may be moved inwardly or outwardly so as to increase or decrease the extent to which the ground between the rows is turned onto the crops.

Each of the sweeps 41 is of conventional construction comprising a shank 47 and a plow 48. As shown in FIG. 4, the shank 47 of one sweep is received through a cylinder 49 secured between the beam and the plate 46, and is fixed in such position at a desired depth by means of a set screw 50. The shank of another sweep is carried in a similar cylinder supported from bracket 51 secured to and extending rearwardly and laterally of the rear frame member 23. As can be seen from the drawings, the plows are substantially in line with the teeth 40, the rear plow being common to two rows of flexible teeth.

As an alternative to the construction just described, one or more of the teeth 40 may be replaced by an intermediate sweep, as shown in FIG. 5. More particularly, the shank 47 of the intermediate sweep is releasably secured between oppositely facing recesses in a clamp 52 and the outer side of a base 53. The inner side of the base is removably fitted over the outer side of a vertical flange of an angle iron forming the beam 42 by means of J-bolts 54. More particularly, the inner ends of the J-bolts hook over the end of the horizontal flange of the angle iron and the outer ends thereof extend through the base 53 and clamp 52 on opposite sides of the recess thereof. Bolts 55 threaded onto the ends of the J-bolts bear against the outside of the clamp 52 to releasably secure the shank of the sweep between the clamp and base. Loosening of these bolts also enables the position of the intermediate sweep to be adjusted longitudinally of the beam 42 as desired.

As shown in FIG. 4, each flexible tooth 40 preferably comprises a thin bar having an upper portion which is secured to the beam by means of bolts 56. This upper portion bends rearwardly and downwardly when so secured and has an intermediate portion 57 which is twisted about its length to provide a lower portion 58 angularly disposed with respect to the forward portion thereof as well as forward movement of the frame. More particu-

larly, the lower edge of the lower portion is tapered to define a forward point 59 for first engaging the ground.

As shown, these teeth are suspended from the beam in substantially equally spaced-apart relation. With their upper portions extending substantially parallel to the forward movement of the frame, the angularly disposed lower portions will turn the soil between the rows to the side toward which they face. Ordinarily, it is desired to turn the soil outwardly toward the adjacent row, as shown in FIG. 4. However, this particular construction of the tooth enables the teeth of the conventional beams to be interchanged with respect to one another so as to turn soil away from the adjacent row crops. Obviously, this may be done without replacing the beams themselves, thereby enabling a considerable saving in time and trouble.

It is contemplated that the gangs of rotary hoes may be removed or lifted, as previously described, to convert this equipment to a more conventional type of cultivator. This may be desirable when the crop grows to a certain height.

The frame 21 is supported for movement over the ground by a pair of wheels 60 mounted on the frame, as best shown in FIG. 6, for engagement with the ground between the rows and, more particularly, between the flexible teeth carried by converging pairs of beams. Thus, with respect to FIG. 6, the axle 61 of each wheel will be seen to be rotatably mounted between a pair of arms 62 pivotally mounted on the lower end of a bracket 63 on the front frame member 22 by means of bolts 64 for swinging about a lateral axis. The forward ends of another pair of arms 65 are pivotally mounted to the upper ends of the bracket 63 by means of pins 66 for swinging about another lateral axis, and the rearward ends thereof are pivotally connected by means of pins 67 to a cross head 68. A turnbuckle 69 is connected at its opposite ends between the rear frame member 23 and the cross head 68 so that the extension and retraction of the turnbuckle is effective to swing the upper arms 65 about the axis of pins 66.

Plates 70 and 71 are secured between the pairs of arms 62 and 65, respectively, and a heavy compression coil spring 72 is disposed between such plates for urging the wheel 60 downwardly. Obviously, swinging of the arms 65 by manipulation of the turnbuckle will adjust the effective force of the spring for so urging the wheel. Thus, these wheels and their supports provide a means for adjusting the force with which the various cultivating elements heretofore described will engage the ground. Obviously, the spring may be compressed to an extent sufficiently to raise the cultivating elements off the ground.

The form of cultivator shown in FIGS. 7 to 9, and designated in its entirety by reference character 73, corresponds in many respects to parts of the cultivator just described and, for this reason, several of the parts thereof are designated by the same reference characters. For example, the cultivator 73 includes a frame 21 from which a plurality of separate gangs 27 of rotary hoes are mounted for swinging about a transverse axis to rotatably engage spaced-apart rows of crops in a laterally extending row and forwardly of such axis during forward movement of the frame. Thus, as previously described, each gang is free-floating so that it engages the ground with substantially the same force as it is "pushed" therealong. Each gang is also swingable about a vertical axis to adjust the angular position of the hoes 29 with respect to forward movement of the frame, as described in connection with the cultivator of FIGS. 1 to 6.

As distinguished from the first form of the invention, however, the form shown in FIGS. 7 to 9 includes additional gangs 74 of rotary hoes 29 for engaging the ground between the row crops. More particularly, and as will be described below these gangs of rotary hoes are also swingable about a lateral axis so as to be "free-floating" and a vertical axis to an angular position in which they will cultivate the soil between the rows and turn it onto an adjacent row crop. As shown in FIGS. 7 and 8, the gangs on opposite sides of the frame are turned oppositely with respect to one another to prevent side draft.

As in the case of the gangs 27, the angular position of the hoes 29 of the gangs 74 may be adjusted to regulate the extent to which the ground is agitated. This adjustment also determines the amount of soil which is turned from between the rows onto adjacent rows—i.e., a greater amount of soil is turned when the angular position of the gangs is increased.

The cultivator 73 may be converted to one of more or less conventional construction, as, for example, when the crops are high, by swinging all the gangs 27 and 74 to positions in which the axes of rotation of the hoes are disposed laterally. This cultivator is also convertible to one of the type described in connection with FIGS. 1 to 6 by the replacement of the gangs 74 with suitable teeth and sweeps suspended from the beams 42.

With reference to FIG. 9, it will be seen that the rotary hoes 29 of each gang 74 are rotatable about a shaft 30 supported from a bracket 77. This bracket is in turn connected to a support 78 which, similarly to the support 28 for the gangs 27, is pivotally supported from the frame for swinging about a lateral axis. However, this support is also rockable about a longitudinal axis so that the rotary hoes of each gang 74 accommodate themselves to the individual rows of crops.

For these purposes, the support 78 includes longitudinally extending and spaced-apart bars 79 having their forward ends pivotally connected by means of pins 80 to a laterally extending bar 81. This latter bar is, in turn, pivotally connected by means of a pin 82 to the front frame member 22 for rocking freely about the aforementioned longitudinal axis. As shown in FIG. 9, the front frame member 22 may be provided with one or more openings 83 therein to permit the lateral adjustment of the support 78 for reasons previously mentioned.

As can be seen from FIG. 7, the rotary hoes of the gangs 74 engage the ground just rearwardly of the rear frame member 3, while those of the gangs 27 engage the ground just forwardly of the front frame member 22. Thus, in addition to engaging the ground rearwardly of the transverse axis about which they swing, so as to be "pulled" therealong, the hoes of the gangs 74 engage the ground rearwardly of the hoes of the gangs 27, so that the supports 28 and 78 cross one another in oppositely extending relation from their pivotal connections to the frame. As previously described, this arrangement reduces to a minimum the front to rear width of the frame while, at the same time, suspending the gangs with a maximum of leverage.

A plate 84 is connected to the rearward ends of the bars 79 and is provided with a pair of spaced-apart openings 85 therein to receive bolts 86 which extend through arcuate slots 87 in the plate 88 extending across the top of the bracket 77. A nut 86a is threaded onto the end of each bolt to enable the aforementioned angular adjustment of the rotary hoes of each gang. Since the legs 89 of the brackets thereof extend downwardly from the plate 88 with the shaft 30 substantially beneath the central pivot pin 90 connecting the plates 84 and 88, the rotary hoes will be kept in substantially the same tracking position regardless of their angular adjustment. Also, as will be apparent from FIG. 9, the plate 84 will be disposed substantially parallel to the ground.

With reference now to FIGURES 10 to 13, the form of the cultivator shown therein, which is designated in its entirety by reference character 91, will also be seen to correspond in many respects to the cultivator first described. Therefore, as in the case of the cultivator shown in FIGS. 7 to 9, similar reference characters are used for indicating similar parts.

The principal distinction between the form of cultivator shown in FIGS. 10 to 13 and that shown in FIGS. 7 to 9 resides in the fact that the single gangs 74 are replaced

by a pair of gangs 92 of rotary hoes 29. That is, although rotary hoes 29 are mounted for swinging about a lateral axis to engage the ground between row crops engaged by the gangs 27 of rotary hoes, in a manner similar to the gangs 74 of rotary hoes, they are split into individual gangs 92 which are arranged in pairs, and the pairs are so mounted from supports 94 as to be swingable into either divergent or convergent relation with respect to one another.

For example, as shown in FIG. 10, the gangs 92 of each pair may be swung into rearwardly convergent relation so as to turn the soil from the ground between the row crops onto such crops. This may be desirable, as previously mentioned when the crops are sufficiently high that the turned soil will cover the weeds without covering the crops. On the other hand, the gangs 92 of each pair may be turned to a position in which they are rearwardly divergent with respect to one another, as shown in FIG. 12, for cultivating the soil while preventing it from being turned onto the rowcrops adjacent thereto. Thus, in this latter case, the gangs 92 may be used to prevent relatively small crops from being covered with the soil.

For this purpose, each gang 92 of rotary hoes is supported from a bracket 95 which is in turn connected to a plate 96 on the rearward ends of bars 97 of the support 94. As best shown in FIGS. 10 and 12, the plate 96 may be provided with arcuate slots 98 to receive bolts 99 connecting the plate to the bracket for swinging similarly to the rotary hoes of gangs 74 of FIG. 9.

Although the gangs 92 of each pair both extend rearwardly so as to be "pulled" over the ground, similarly to the gangs 74, the support 94 for one of them is longer than the support for the other so that the one gang engages the ground rearwardly of the ground. This permits the gangs 92 of each pair to be adjusted angularly despite a lateral overlap with one another for maintaining full ground coverage between the rows, regardless of their angular positions. As in the case of the cultivator 73, however, the cultivator 91 may be converted into a more or less conventional rotary cultivator by swinging gangs 27 and 92 into positions with the rotational axes of the rotary hoes disposed laterally of the frame.

Although the means for mounting the "pushed" gangs 27 of rotary hoes for the form of cultivator shown in FIGS. 10 to 13 corresponds in many respects to that shown in FIG. 3, it will be noted from FIG. 13 that the pivotal axis about which the rotary hoes of these gangs swing has been lowered. This may be desirable, for example, to lessen the force with which the hoes engage the ground.

Thus, a pair of arms 100 are secured to the rear frame member 23 in depending relation therefrom and are pivotally connected at their lower ends by pins 101 to the rear ends of longitudinally extending bars 102 of a support 103. Similarly to the support 28 described in connection with FIG. 3, support 103 includes a plate 104 connecting the forward ends of the bars 102 and having longitudinal spaced-apart slots 105 to receive bolts 106. These bolts extend through lateral slots 107 in a plate 108 of bracket 109 supporting the axle for the rotary hoes 29 to permit the angular relation of the gangs 27 of rotary hoes to be adjusted in a manner previously described.

As also shown in FIG. 13, each gang may be raised above ground level by means of a chain 110 suspended from the frame during transporting of the cultivator to and from jobs. The support 103 is provided with crossed bracing members 111 as well as longitudinally extending reinforcing rods 112 which connect with the front frame member 22.

As shown in FIGS. 10, 11 and 12, other additional gangs 113 of rotary hoes may be mounted on the frame 21 outside of the endmost gangs 27 for swinging in the same manner as each gang 92. Also, of course, the angular adjustment of the gangs 113 may be adjusted as desired.

The cultivator illustrated in FIGS. 14 to 17, and designated in its entirety by reference character 210, correspond in many respects to the one shown in FIGS. 10 to 13. Thus, it comprises a frame 211 having parallel laterally extending front and rear members 212 and 213, respectively. The latter are rigidly connected to one another by cross members 214 along their opposite ends and intermediate portions. The frame is adapted to be moved forwardly (downwardly in FIGS. 14 and 15 and away from the viewer in FIGS. 16 and 17) by means of a tractor 215 connected thereto by a conventional three point hitch 216 or other suitable means connected to the intermediate cross members 214.

Separate gangs 217 of rotary hoes are mounted from the frame 211 for free swinging about a transverse axis to rotably engage spaced-apart rows of crops (see FIGS. 16 and 17) in a laterally extending row during forward movement of the frame. More particularly, each gang 217 is individually mounted from the front end of a support 218 pivotally connected at 218a (FIGS. 16 and 17) to the rear frame member 213 for extension forwardly thereof. In this manner, and as explained in connection with previous embodiments, the rotary hoes of gangs 217 are "pushed" over the row crops so as to engage the ground with greater force than in the customary "pulled" type of hoe. As shown in FIGS. 16 and 17, chains 218b connect each support 218 with the frame so that the gangs may be raised during turning or transportation.

Each gang 217 includes a plurality of individual hoes 219 which are shown only diagrammatically in the drawings, but which may be of conventional construction, as will be described hereinafter in connection with the rotary hoes of the rear gangs. In any case, the rotary hoes are rotatably mounted about a shaft (not shown) carried by a bracket 220 which is, in turn, connected to a plate 222 on the front end of the support 218 for swinging about a vertical axis. Thus, as shown and described in previous embodiments, each bracket is suspended from a plate by means of lugs 223 which extend through openings in each plate and laterally extending openings 224 in the top of the bracket 222. More particularly, these openings in the plate 222 are elongated in a longitudinally extending direction to permit this swinging about a vertical axis. Thus, although the hoes 219 of the gangs 217 are shown in FIGS. 14 to 17 to be disposed parallel to the direction of movement of the frame, they may be turned or swung either clockwise or counterclockwise to any desired position. At the same time, each gang 217 may be adjusted laterally with respect to the frame to accommodate different spacing between rows of crops as well as to compensate for the aforementioned swinging about the vertical axis.

Each rear gang 225 is mounted from the frame 211 by means of a support 226 pivoted from the front frame member 212 in any suitable manner, such as shown in the previous embodiments. Each support extends rearwardly from the front of the frame and each gang 225 is mounted on the rear end of its support 226 to engage the ground rearwardly and intermediate the engagement of the forward gangs 217 with the row crops. More particularly, and as shown in FIGS. 14 and 15, the rear gangs 225 are arranged in pairs intermediate adjacent front gangs 217, with the support 226 for one gang of such pair being longer than the other so that the gangs of each pair are longitudinally offset with respect to one another. As will be obvious from FIGS. 14 and 15, this enables the rear gangs to overlap laterally to provide full coverage of the ground intermediate the row crops. As shown in FIGS. 16 and 17, there are chains 226a to connect the supports with the frame for raising the gangs 225 with the gangs 217.

Although the illustrated cultivator has only two front gangs 217 for cultivating an equal number of row crops, it is obvious that more front gangs, as well as corresponding rear gangs therebetween, may be provided as desired.

Each gang 225 also includes a plurality of rotary hoes 227 rotatably mounted about a shaft 228 (see FIGS. 16 and 17) carried by a U-shaped bracket 229. As shown by the rightmost rotary hoe 227 in FIG. 16, each comprises a hub 230 having a plurality of radially extending legs 231 thereon with the outer ends of the legs being turned forwardly. As previously mentioned, each rotary hoe 19 of the forward gangs 217 may be similarly constructed.

As in previous embodiments, each rear gang 225 is suspended from its support 226 for pivoting about a vertical axis by means of bolts 232 which extend through arcuate grooves 233 (FIGS. 14 and 15) in the outer end of each support 226 as well as holes 229a in the upper cross member 229a of each bracket 229. More particularly, there is an intermediate bolt 234 which extends through each support and bracket to permit the bracket to swing thereabout as the bolts 232 slide within the grooves 233.

Thus, the bracket 229 of each of the gangs 225 may be swung between the position shown in FIGS. 14 and 16, wherein the pair intermediate the front gangs 217 are rearwardly convergent, and the position of FIGS. 15 and 17, wherein such pairs of rear gangs are rearwardly divergent. In the former position, as described in the embodiment of FIGS. 10 to 13, the rotary hoes of each rear gang turn the ground intermediate the rows of crops in a direction onto them. On the other hand, in the latter position, the hoes of the rear gangs 225 turn the ground away from the crops.

In accordance with this particular embodiment, however, each rear gang 225 is also swingable about a substantially horizontal axis which extends parallel to the path of rotation of the rotary hoes of each such gang. As previously described, and as best illustrated in FIGS. 16 and 17, this enables each rear gang 225 to be swung or tilted between positions for engaging the ground intermediate either deep planted crops (FIG. 16) or high planted crops (FIG. 17). In both such positions, each gang 225 may also be swung about its vertical axis, and in a manner previously described, between positions for turning the ground away from the crops (FIG. 17) or toward the crops (FIG. 16). Of course, FIGS. 16 and 17 show only a part of the rear of the cultivator, and it will be understood that the other forward gang 217, together with the rear gangs 225 disposed for engaging the ground on each side thereof, will simultaneously cultivate an adjacent row of crops.

The aforementioned tilting of each rear gang 225 is accomplished by the provision of bearing parts in the form of castings 235 and 236 on the lower side of the support 226 and cross member 229b of the bracket 229, respectively. More particularly, each casting 235 is provided with a longitudinally extending groove 237 having an arcuate bearing surface for a longitudinally extending and arcuately shaped ridge 238 on the upper side of the casting 236. Thus, with the nuts on the ends of the bolts 234 tightened up against support 226 and cross member 229b, the bearing surface on the ridge 238 is slidable over the bearing surface on the groove 237 to enable the bracket 229, and thus each gang 227, to swing about the aforementioned horizontal axis.

As also shown in FIGS. 16 and 17, each of the bolts 232 is of such length and threaded to such an extent as to permit its effective length to be adjusted between those illustrated in FIGS. 16 and 17. Thus, nuts 239 threaded onto each end of the bolts 232 may be taken up or backed off to shorten or lengthen the effective portion of the bolt 232 on opposite sides of the intermediate bolt 234 for swinging the rear gangs 225 between and holding them in different tilted positions. For example, the upper nuts 239 on the inboard bolts 232 may be taken up while those on the outboard bolts 232 are let out to swing the rearward gangs shown in FIG. 16 from a position for engaging the ground on opposite sides of deep planted crops to a position, as shown in FIG. 17, for engaging such ground on opposite sides of high planted crops.

When the bolts 232 and 234 extend through the castings 235 and 236 the openings through such castings as well as the support and cross member of the bracket are enlarged to permit the bolts to swing slightly from one side to the other of a vertical position, as indicated by the broken away portion of FIG. 16. As shown in FIGS. 14 and 15, there are a number of pairs of openings 229a spaced laterally across the member 229b. These permit the bolts 232 to be extended through different pairs of such openings for adjusting the lateral position of each gang with respect to the frame. Obviously, as the rear gangs 225 of each pair are tilted at greater angles with respect to the horizontal, their inner adjacent ends are moved relatively apart so that this lateral adjustment may be necessary to keep them in laterally overlapping relation, as shown in FIGS. 14 and 15.

Although other means may be provided for tilting and laterally adjusting each rear gang, the mechanism shown is preferred because of its simplified construction as well as the ease with which it may be attached to an existing cultivator constructed in accordance with the embodiment of FIGS. 10 to 13. Thus, it is merely necessary to secure the brackets 235 and 236 to the existing support and bracket, respectively, provide the additional pairs of openings 229a through such brackets, and assemble the bolts 232 and 234.

In a preferred form of the invention, an angle iron 240 is secured to and extended rearwardly from one side of the longest support 226 for the gangs 225 to mount a plow 241 in position for engaging the ground intermediate the engagement therewith of each gang of the pair of gangs intermediate the front gangs 217. Thus, as shown in FIG. 16, when the rows of crops are deep planted, this plow 241 will engage the highest portion of the ground intermediate the crops. On the other hand, when the crops are planted high, the plows 241 will engage such ground at its lowest point. As best shown in FIGS. 16 and 17, each plow is carried from the angle iron 240 by means of a bracket 242 which is adjustable longitudinally of the angle iron and also of such construction as to enable the lower end of the plow to be raised or lowered. However, the details of the bracket 242 form no part of the present invention.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth, together with other advantages which are obvious and which are inherent to the apparatus.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

The invention having been described, what is claimed is:

1. A cultivator, comprising a frame adapted to be moved forwardly over the ground, separate gangs of rotary hoes mounted from the frame for swinging about a transverse axis to rotatably engage spaced-apart rows of crops forwardly of such axis and in a laterally extending row during forward movement of the frame, means for adjusting the angular relation of the path of rotation of the hoes of each gang with respect to the forward movement of the frame, and means carried by the frame for turning the ground intermediate adjacent rows of said

crops and rearwardly of the engagement therewith of said gangs onto the crops.

2. A cultivator of the character defined in claim 1, wherein said ground turning means comprises additional separate gangs of rotary hoes pivotally mounted on the frame for swinging about a transverse axis to rotatably engage the ground rearwardly of said last-mentioned axis and the engagement with the rows of the first-mentioned gangs during forward movement of the frame, and means for adjusting the angular relation of the path of rotation of the hoes of each of said additional gangs with respect to the forward movement of the frame.

3. A cultivator of the characted defined in claim 2, wherein the axis about which the first-mentioned gangs swing is disposed rearwardly of the axis about which the additional gangs swing.

4. A cultivator, comprising a frame adapted to be moved forwardly over the ground, a gang of rotary hoes mounted on the frame for swinging about a transverse axis to rotatably engage a row of crops forwardly of such axis during forward movement of the frame, means for adjusting the angular relation of the path of rotation of the hoes of said gang with respect to the forward movement of the frame, and means carried by the frame for turning the ground on opposite sides of said row of crops and rearwardly of the engagement therewith of said gang onto the crops.

5. A cultivator of the character defined in claim 4, wherein said ground turning means comprises a pair of additional gangs of rotary hoes each pivotally mounted on the frame for swinging about a transverse axis to rotatably engage the ground on one opposite side of said row of crops and rearwardly of said last-mentioned axis and the engagement with the row of the first-mentioned gang during forward movement of the frame, and means for adjusting the angular relation of the path of rotation of the hoes of each of said additional gangs with respect to the forward movement of the frame.

6. A cultivator of the character defined in claim 5, wherein the axis about which the first-mentioned gang swings is disposed rearwardly of the axis about which the additional gangs swing.

7. A cultivator, comprising a frame adapted to be moved forwardly over the ground, a plurality of separate gangs of rotary hoes, means mounting the gangs from the frame for rotatably engaging spaced-apart rows of crops in a laterally extending row during forward movement of the frame, the mounting means for each gang including a support pivotally connected to the frame for swinging about a transverse axis and extending substantially longitudinally therefrom, a plate on the forward end of the support, a bracket including a plate and bars extending substantially longitudinally therefrom in the same direction as the support to support the gang of rotary hoes about an axis longitudinally spaced from said last-mentioned plate, and means connecting the bracket to the support for swinging about a vertical axis comprising lateral slots in one and spaced-apart longitudinal slots in the other of the plates of the support and bracket, and bolts extending through the slots.

8. A cultivator, comprising a frame adapted to be moved forwardly over the ground, separate gangs of rotary hoes individually mounted on the frame for swinging about a transverse axis to rotatably engage spaced-apart rows of crops in a laterally extending row during forward movement of the frame, additional separate gangs of rotary hoes individually mounted from the frame for swinging about a transverse axis to rotatably engage the ground between the rows of crops rearwardly of the engagement of the hoes of the first-mentioned gangs therewith during forward movement of the frame, and means for adjusting the angular relation of the path of rotation of the hoes of each gang with respect to the forward movement of the frame.

9. A cultivator of the character defined in claim 8, wherein the additional gangs include a single gang engageable with the ground between adjacent rows of crops engaged by the first-mentioned gangs.

10. A cultivator of the character defined in claim 8, wherein the additional gangs include a pair of gangs engagable with the ground between adjacent rows of the crops engaged by the first-mentioned gangs and swingable between convergent and divergent positions.

11. A cultivator of the character defined in claim 10, including means for adjusting and fixing the angular relation of each gang of each pair of gangs with respect to the ground level between positions tilted from one side to the other of a level position.

12. A cultivator of the character defined in claim 10, wherein the gangs of each pair are mounted to engage the ground in longitudinally offset relation with one another.

13. A cultivator of the character defined in claim 8, including means for adjusting the position of each additional gang laterally of the frame.

14. A cultivator, comprising a frame adapted to be moved forwardly over the ground, a plurality of separate gangs of rotary hoes, means individually pivotally mounting the gangs from the frame for swinging about a transverse axis to rotatably engage spaced-apart rows of crops in a laterally extending row during forward movement of the frame, means for swinging the gangs about a vertical axis to adjust the angular relation of the path of rotation of the hoes of each gang with respect to the forward movement of the frame, additional separate gangs of rotary hoes, means individually pivotally mounting such additional gangs from the frame for swinging about a transverse axis to rotatably engage the ground in pairs rearwardly of and laterally intermediate the engagement of the first-mentioned gangs with the rows of crops during said forward movement of the frame, the gangs of each pair being longitudinally spaced of one another, and means for swinging the gangs of each pair about vertical axes between positions in which the paths of rotation of the hoes thereof are rearwardly convergent or divergent.

15. A cultivator of the character defined in claim 14, including means pivotally mounting each gang of said pair for swinging about an axis disposed at least substantially horizontal with respect to the ground level to tilt it from one side to the other and fix it in such tilted position.

16. A cultivator of the character defined in claim 15, including a plow carried on the mounting means for one gang of each of said pair of gangs to break the ground intermediate and rearwardly of the engagement therewith of said pair.

17. A cultivator of the character defined in claim 14, wherein the axis about which each of the first-mentioned gangs swings is disposed rearwardly of the engagement of said gang with a row of crops, and the axis about which each of said additional gangs swings is disposed forwardly of the engagement of said gang with the ground intermediate said rows of crops.

18. A cultivator of the character defined in claim 14, including means for adjusting the position of each additional gang laterally of the frame.

19. A cultivator of the character defined in claim 18, including means pivotally mounting each gang of said pair for swinging about an axis disposed at least substantially horizontal with respect to the ground level to tilt it from one side to the other and fix it in such tilted position.

20. A cultivator, comprising a frame adapted to be moved forwardly over the ground, a gang of rotary hoes mounted on the frame for swinging about a transverse axis to rotatably engage a row of crops during forward movement of the frame, a pair of additional gangs of rotary hoes each mounted from the frame for swinging about a transverse axis to rotatably engage the ground

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on each opposite side of the row of crops and rearwardly of the engagement of the hoes of the first-mentioned gang therewith during forward movement of the frame, and means for adjusting the angular relation of the path of rotation of the holes of each gang with respect to the forward movement of the frame.

21. A cultivator of the character defined in claim 20, including means for adjusting and fixing the angular relation of each gang of said pair of gangs with respect to the ground level between positions tilted from one side to the other of a level position.

22. A cultivator, comprising a frame adapted to be moved forwardly over the ground, a gang of rotary hoes, means pivotally mounting the gang from the frame for swinging about a transverse axis to rotatably engage a row of crops during forward movement of the frame, means for swinging the gang about a vertical axis to adjust the angular relation of the path of rotation of the hoes of said gang with respect to the forward movement of the frame, a pair of additional gangs of rotary hoes, means pivotally mounting each such additional gang from the frame for swinging about a transverse axis to rotatably engage the ground on each opposite side of said row of crops during said forward movement of the frame, and means for swinging the gangs of said pair about vertical axes between positions in which the paths of rotation of the hoes thereof are rearwardly convergent or divergent.

23. A cultivator of the character defined in claim 22, including means for adjusting and fixing the angular relation of each gang of said pair of gangs with respect to the ground level between positions tilted from one side to the other of a level position.

24. A cultivator of the character defined in claim 23, including means for adjusting each gang of said pair of gangs laterally of the frame.

25. A cultivator, comprising a frame adapted to be moved over the ground separate gangs of rotary hoes pivotally mounted on the frame for rotatably engaging spaced-apart rows of crops during forward movement of the frame, additional gangs of rotary hoes each comprising a substantially U-shaped bracket carrying a shaft upon which the hoes are rotatably mounted, supports pivotally mounted on the frame to mount the additional gangs for rotatably engaging the ground intermediate the crops and in longitudinally offset pairs, each support having a bearing part thereon and the bracket of the gang mounted on said support having an upper cross

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member with a bearing part thereon slidable over the support bearing part for tilting the bracket from one side to the other, a pair of slots in one of said support and bracket, said upper cross members having bolt receiving means extending along the upper cross member, and means including bolts extending through the slots and bolt receiving means to alternately hold the bracket bearing part tightly against the support bearing part and permit the bolts to be swung within the slots for disposing the rotary hoes of each pair in rearwardly divergent or convergent relation with respect to the forward movement of the frame and to be moved into different locations within the bolt receiving means to adjust the lateral position of said bracket with respect to said support.

26. A cultivator of the character defined in claim 25, including a plow on the support for the rearwardly disposed gang of each pair of gangs for breaking the ground intermediate and rearwardly of the engagement therewith of said pair.

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P. T. SEWELL, Assistant Examiner

U.S. Cl. X.R.

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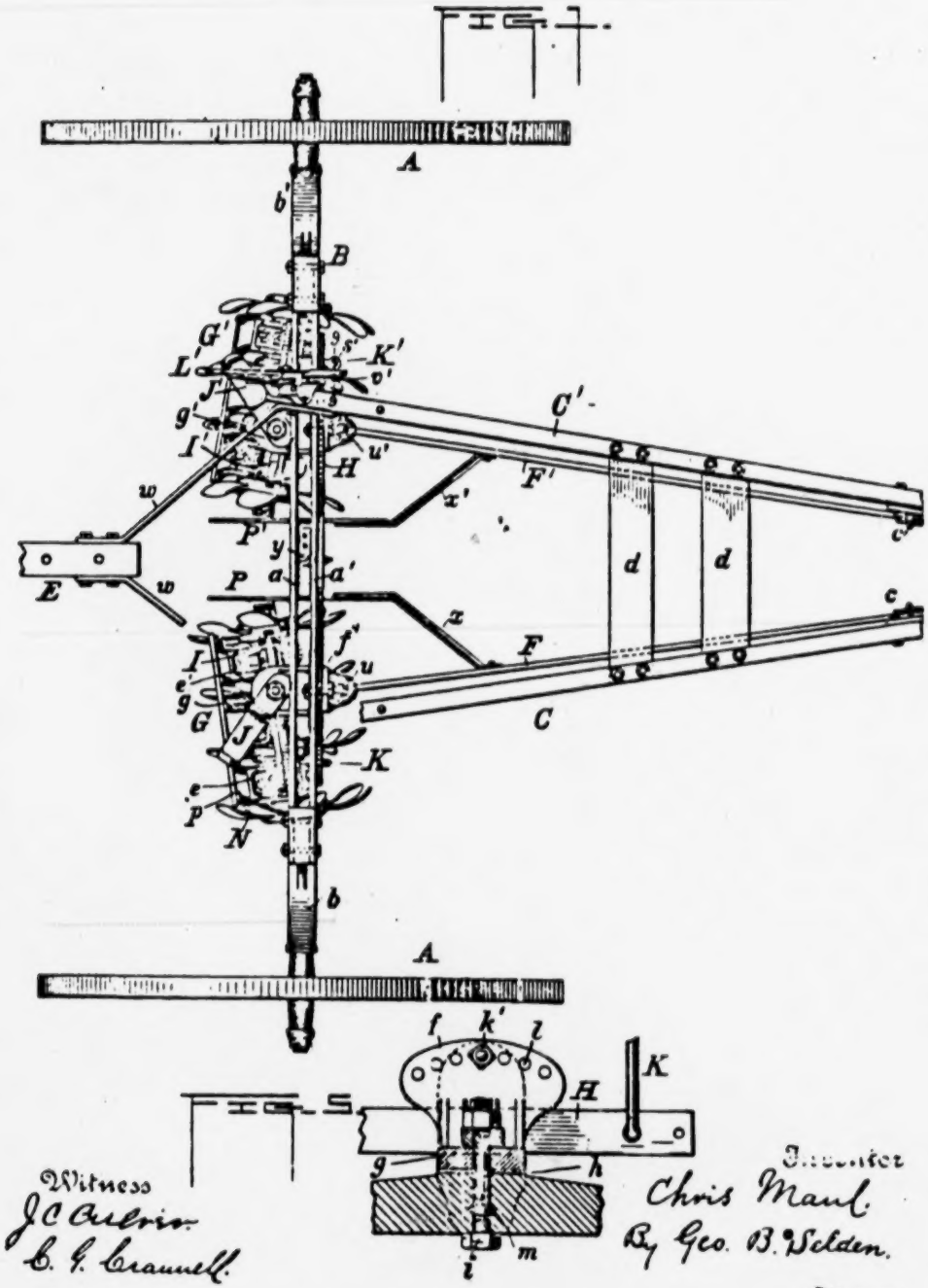
C. MAUL.

CULTIVATOR.

No. 529,457. Patented Nov. 20, 1894.



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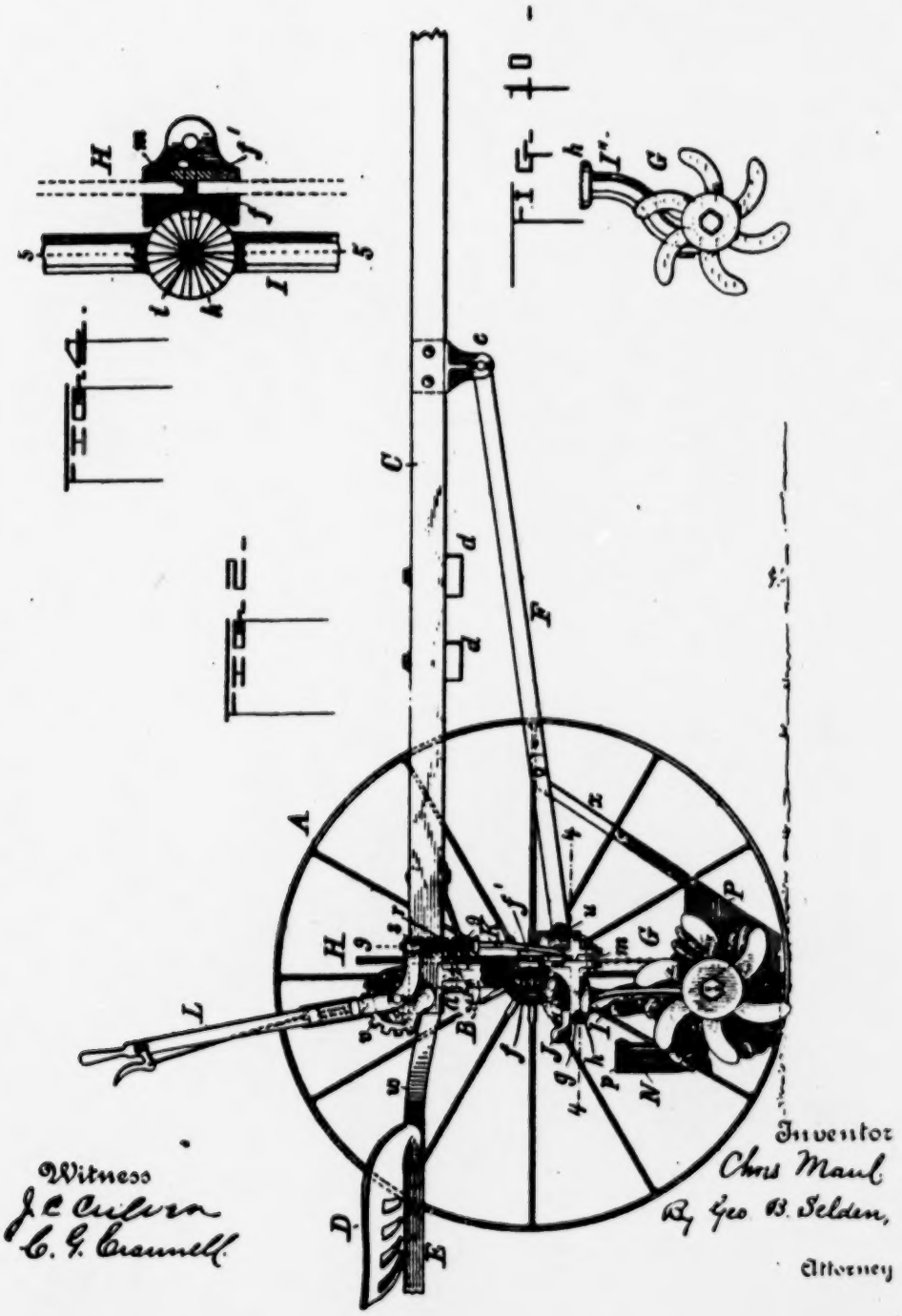

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C. MAUL.

CULTIVATOR.

No. 529,457. Patented Nov. 20, 1894.

FIG. 3.

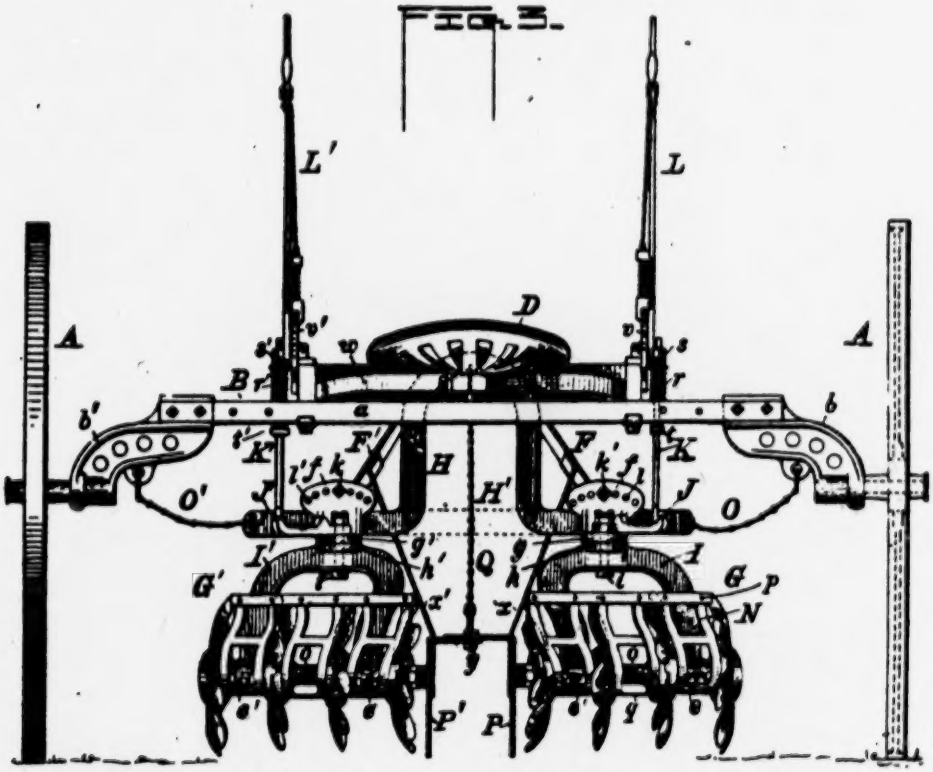

FIG. 6.

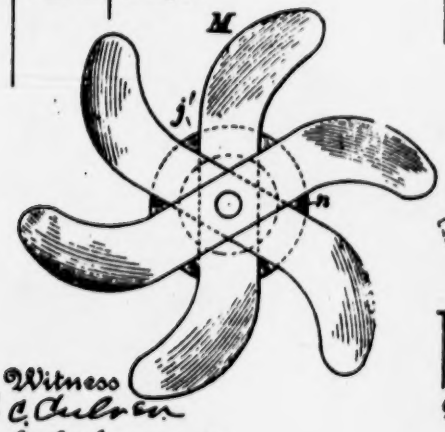

FIG. 7.

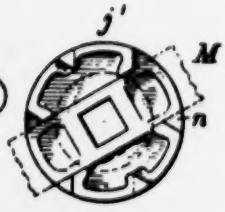

FIG. 8.

FIG. 9.

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CULTIVATOR.

SPECIFICATION forming part of Letters Patent No. 529,457, dated November 20, 1894.

Application filed November 15, 1893. Serial No. 491,086. (No model.)

To all whom it may concern:

Be it known that I, CHRIS MAUL, a citizen of the United States, residing at Brockport, in the county of Monroe, in the State of New York, have invented certain Improvements in Cultivators, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to certain improvements in cultivators, which improvements are fully described and illustrated in the following specification and the accompanying drawings, the novel features thereof being specified in the claims annexed to the said specification.

In the accompanying drawings representing a cultivator embodying my improvements—Figure 1 is a plan view. Fig. 2 is a side elevation. Fig. 3 is a rear elevation. Fig. 4 is a plan view of a portion of the arch, showing its head with radial teeth, and also a section through the plates by which the arch is attached to the yoke. Fig. 5 is a vertical section through the upper part of the arch, on the line 5—5, Fig. 4, showing the plates in front of such line. Fig. 6 is a side view of the spading teeth. Figs. 7 and 8 represent the collars which support the teeth. Fig. 9 is a section on the line 9—9, Figs. 1 and 2. Fig. 10 represents a modification.

In the accompanying drawings A A are the wheels; B, the axle; C C′, the divided pole or tongue; D, the driver's seat; E, the seat-support; F F′, the draw-bars and G G′ the sections or gangs of radial curved spading teeth.

The axle B is composed of the arms or brackets *b b′*, provided with the journals on which the wheels revolve, and the parallel bars *a a′*, which combine strength with lightness. The gangs of spading teeth are connected together by the yoke H, placed in front of the axle, and connected to the rear ends of the draw-bars F F′, the forward ends of which are pivoted to the divided pole as indicated at *c c′*.

d represents suitable cross-bracing for the tongue, which is provided with means of attaching the whiffletrees in any usual manner.

The gangs are attached to the yoke H by the arches, I I′, which at their lower ends are provided with suitable journal-boxes *e e′*, in which the gangs of spading teeth revolve. The arches carrying the gangs are attached to the yoke by the clamp-plates *j j′*, so that the gangs may be adjusted on the yoke laterally and secured at any desired distance apart. The arches of the gangs are provided with suitable foot-pieces or rests J J′, by which the driver while on the seat, is enabled to move the gangs sidewise in either direction. Provision is made for allowing the gangs of teeth to play vertically, by means of springs on the rods K K′, and the upper ends of these rods are connected with the bent lower ends of the levers L L′, so that the gangs can be adjusted to spade to different depths, or raised entirely clear of the ground. It will also be understood that the gangs of teeth are reversible,—that is, they can be unclamped from the yoke, and replaced with the curved teeth pointing in the opposite directions, so as to throw the soil toward or away from the row of plants under cultivation. In addition to these adjustments and movements, the gangs are attached to the yokes so that they may be set with their axes at different angles in the horizontal plane,—the upper ends of the arches being provided with the radially notched heads *h h′* which engage with corresponding notches in the heads *g g′* attached to one of the clamp-plates *f f′*,—bolts *i i′* being provided to secure the notched heads together in any desired position, with the axes of the gangs set at any desired angle with the line of draft. The gangs may also be set to work with their axes at any desired angle with the ground in the horizontal direction,—that is, with one end higher than the other, by means of the bolts *k k′* and the curved row of holes *l l′* in one of the plates *f f′*,—these plates being swung relatively to each other on the bolt *m*, Figs. 2 and 4, placed below the yoke. It will thus be perceived that provision is made for the adjustment of the gangs of spading teeth relatively to each other to any desired distance between their inner ends, that they can be moved together laterally as any crookedness in the row of plants under cultivation may require, that they are self-adjusting vertically, that the depth of cut may be varied, that the gangs can be raised entirely out of the soil, and that they may be reversed so as

to throw the earth toward or away from the row, and they may be shifted about the vertical in such fashion as to vary the angles which their axes make with the line of draft,—and also that they may be set with their inner ends higher than the outer ends, or vice versa. The advantages of the curved rotating spading teeth in their opperation on the soil are at the same time preserved.

Proceeding to a more detailed description of the mechanism by which these adjustments and movements are secured, the gangs or sections of spading teeth may consist of any preferred number of blades M, Fig. 6, arranged in sets between the heads *j j'*, or of any preferred number of such sets.

In the accompanying drawings, I have shown four sets of spading teeth or blades, but I have obtained satisfactory results with two and three. A larger number may be used if desired. The shape of the blades will be understood from the accompanying drawings. They are perforated at the center for the shafts of the gangs, and are secured together at angles with each other, preferably in sets of three in each set, as indicated in Figs. 6, 7 and 8 of the drawings, in notches of different depths in the opposing faces of the collars or heads *j j'*. The collars are compelled to revolve with the blades by the angular projections *n* which engage between the edges of the blades. The opposing faces of the collars may be recessed to save weight. The collars are separated from each other by the spools *o*, Fig. 3,—the whole gang being secured together by a central rod provided with a head on one end and a nut on the other. The spools *o* revolve in the journal boxes *e e'*. The gangs may be provided with the clearers N, which consist of suitably curved bars, arranged on the rear side and attached at their lower ends to the journal-boxes *e e'*, and connected together at their upper ends by the bar *p*. The lower ends of the clearers are connected together by a bar, *q*, Fig. 3.

The arches I I' are connected to the clamp-plates *f f'* by the notched heads *g g'*, *h h'* and the bolts *i i'*, so that the axes of the gangs can be set at any required angle with the axle or the line of draft. The plates *f f'* are attached together below the horizontal arms of the yoke H by the bolts *m*, and above the yoke by the bolts *k k'*. One of the plates, carrying the head *g*, is provided with a series of holes *l'*, arranged in a circle having the bolt *m* as a center, so that, by inserting the upper bolt *k'* in these holes, the axis of the gang may be set at an angle with the horizontal line,—with either end higher than the other. The clamp-plates permit the gangs to be secured to the yoke at different distances apart. The rods K K' are hooked at their lower ends and inserted in holes in the outer ends of the yoke,—the upper ends of the rods passing through the sockets *s s'*, and being provided with the springs *r r'* which hold the gangs down to their work, but permit a certain amount of vertical movement. The sockets are pivoted in openings in the lower bent ends of the levers L L',—the pivot *q'*, Fig. 9 being secured in place by being riveted over. The opening in the socket *s* through which the rod K passes is rounded or beveled on the inside, to permit the free movement of the rod. The rod is provided with washers on each side of the socket,—the upper one being secured in place by a pin or spring-key. At their lower ends the springs *r r'* bear on the collars *t t'*, secured on the rods in any suitable way. The result of this construction is that the gangs are permitted to move upward, compressing the springs, on encountering lumps or irregularities in the soil, while at the same time they are permitted entire freedom of lateral movement or of adjustment, as already described.

The draw-bars F F' are pivoted to the front clamp-plates *f'*, as indicated at *u u'*, Fig. 1,—sufficient freedom being given to these joints to permit the movements of the gangs. One of the levers L is omitted from Fig. 1. The levers are pivoted to notched segments *v v'* on the pole, and the lever is provided with any suitable spring-catch and actuating mechanism, so that the driver, by pulling the upper ends of the levers back, can raise the gangs, or one of them, so as to vary the depth of the cutting, or to lift them entirely free of the soil. The wheel next the observer is omitted in Fig. 2.

In Fig. 10 I have represented a modified form of the arch, I'', it being bent or curved backward, so that the yoke H is placed some distance in front of the axle, while the spading teeth are still kept in proper position for action on the ground between the lower portions of the wheels.

The seat-support E is carried by the braces *w*. The lateral movements of the gangs may be limited by the chains O O' Fig. 3.

For certain kinds of work, the guards or fenders P P' may be employed between the inner ends of the gangs. These guards consist of suitably shaped plates, attached to the draw-bars F F' by the bars *x x'*, and connected together so that they may be adjusted laterally to vary the distance between them, by means of the bolt *y* passing through slots or a series of holes in arms on the plates. A chain Q may be employed to control the vertical position of the guards.

The yoke H may be a straight bar, as indicated by the dotted lines II', in Fig. 3.

My improved cultivator is cheap and durable in construction, and is adapted to a great variety of uses which will be understood by the practical farmer.

I claim—

1. The combination, of the wheels and frame of a cultivator, of the pair of laterally movable reversible rotating sections of gangs of radial curved spading teeth, the yoke H, the lifting rods K K', levers L L', and pivoted sockets *s s'*, said sockets having rounded or

beveled openings to receive the rods, substantially as set forth.

2. The combination, with the wheels and frame of a cultivator, of a yoke, gangs of teeth mediately connected by the yoke, foot rests J, gang suspending rods loosely connected to the yoke, supporting springs r r', sockets s s' and levers L L' said sockets having a rounded or beveled opening to receive the rod and having a pivoted connection with the levers, substantially as set forth whereby movements of the gangs in various directions under the influence of the driver's foot or otherwise are permitted.

3. The devices for adjustably supporting gangs of cultivator teeth comprising the spring suspended yokes, the plates *f f'* having holes *l l'* and heads *g g'*, said plates being secured together by transverse bolts, arches I I' having heads *h h'*, securing bolts *i i'* passing axially through the heads, said heads *g* being offset from the plates *f* and the foot rests J J' secured upon the top of the offset heads by the bolts that hold the heads together, whereby the gangs can be adjusted on either a vertical or horizontal axis and whereby they can be independently pushed in lateral direction, substantially as set forth.

4. The devices for adjustably supporting gangs of cultivator teeth comprising the spring-suspended yokes, the plates *f f'* having holes *l l'* and heads *g g'*, said plates being secured together by transverse bolts, arches I I' having heads *h h'*, securing bolts *i i'* passing axially through the heads, said heads *g* being offset from the plates *f* and the foot rests J J' secured upon the top of the offset heads by the bolts that hold the heads together, whereby the gangs can be adjusted on either a vertical or horizontal axis and whereby thay can be independently pushed in lateral direction, and drawbars F F' pivotally connected to the pole and to the yoke clamping plates, substantially as set forth.

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May 9, 1933. O. BRAUN 1,908,110

ROTARY HOE ATTACHMENT FOR CULTIVATORS

Filed Sept. 26, 1931

Fig. 1.

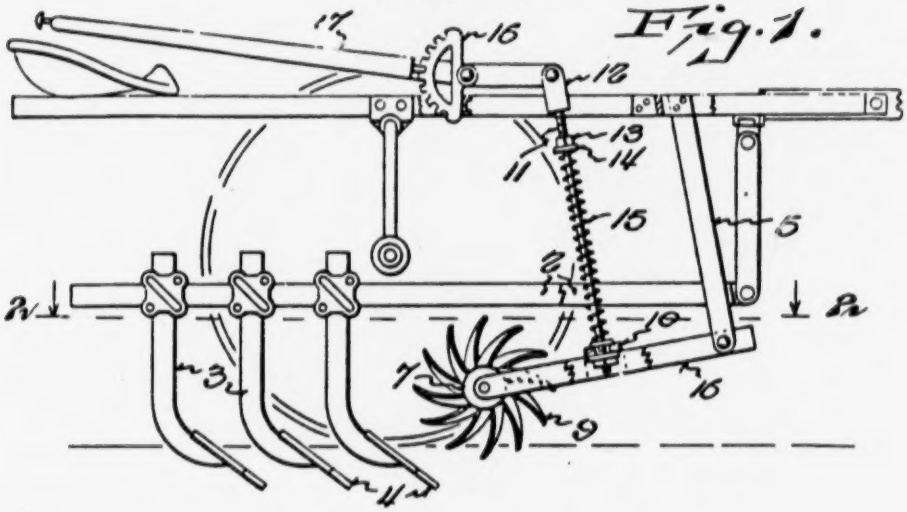
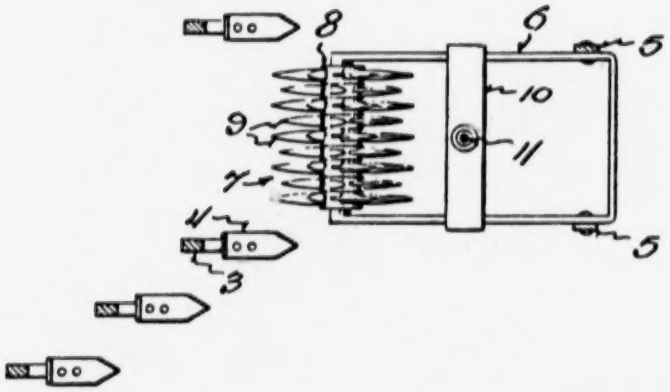


Fig. 2.



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UNITED STATES PATENT OFFICE

OSWIN BRAUN, OF CROSS PLAINS, WISCONSIN

ROTARY HOE ATTACHMENT FOR CULTIVATORS

Application filed September 26, 1931. Serial No. 565,259.

This invention pertains to cultivators, and more particularly to a rotary hoe attachment for conventional cultivators used for row crops such as corn and the like.

The ordinary fixed tooth cultivator used upon row crops has been found deficient, in that it is impossible to cultivate the ground and eliminate small weeds closely adjacent the rows and between successive plants.

It is therefore the primary object of the present invention to provide an attachment for conventional row crop cultivators, such as illustrated, which will effectively cultivate the soil closely surrounding each plant, thus eliminating all weeds and conditioning the soil to produce the most desirable results.

Incidental to the foregoing, a more specific object resides in the provision of an attachment consisting of a rotary hoe, resiliently and adjustably carried by the cultivator frame, and positioned in the space between the transverse sets of cultivator teeth to ride over the row in such manner that the ground surrounding the plant and necessarily missed by the cultivator teeth is entirely cultivated without damage to the plants.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claim, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claim.

In the accompanying drawing is illustrated one complete example of the physical embodiment of the present invention constructed according to the best mode so far devised for the practical application of the principles thereof.

Figure 1 is a fragmentary elevation of a conventional row crop cultivator with the present invention applied thereto, parts being broken away and in section to more clearly illustrate structural details, and

Figure 2 is a plan section taken on the line 2—2 of Figure 1.

Referring now more particularly to the accompanying drawing, the numeral 1 designates the main frame of a conventional cultivator supported in the usual manner upon wheels indicated by dotted lines.

Supported below the main frame in the usual manner is a pair of beams 2, each of which carries a set of depending arms 3 provided with the usual cultivator teeth or shares 4.

While a specific type of tooth cultivator has been illustrated, it is to be understood that the invention is equally applicable to various structures, and therefore the cultivator forms no part of the invention other than in the combination, as hereinafter claimed.

Secured to the main frame of the cultivator is a pair of spaced depending arms 5 having pivotally connected to their lower ends a yoke or frame 6 having a rotary hoe 7 revolubly carried at its rear end, the hoe 7 comprising a hub 8 provided with staggered, arcuate teeth 9 similar in construction to conventional rotary hoes now on the market.

Connecting the arms of the yoke 6 is a transverse strap 10 having secured therein a rod 11 threaded at its upper end for reception of the clevis 12. Threaded on the upper end of the rod 11 is a nut 13 which retains the washer 14, and disposed between the washer 14 and strap 10 is an expansible coil spring 15 which serves to create a tension upon the yoke or frame 5, as will be hereinafter described.

Secured to a portion of the main frame 1 is a detent 16 to which is pivotally connected a hand lever 17, the free end of which is pivotally connected to the clevis 12.

As will be noted in Figure 2, the rotary hoe 7 carried by the yoke 6 is positioned immediately ahead and between the transverse sets of cultivator teeth 4.

From the foregoing explanation, it is believed that the operation of the present invention will be quite apparent in that as the cultivator is drawn over a row of crops with the transverse sets of cultivator teeth positioned upon opposite sides of the row, the rotary hoe 7 will pass directly over the row,

thus serving to cultivate the ground immediately surrounding the plants and missed by the opposite sets of cultivator teeth.

In practise it has been found that the cultivator hoe serves to effectively cultivate the soil without mutilation of the plants, inasmuch as the same has a rolling action, and therefore all weeds closely surrounding the plants and inaccessible to the cultivator teeth are eliminated. It is believed that the result will be quite obvious in that complete elimination of weeds is obtained and the soil left in condition to produce the most desirable results.

It has been found in some instances, particularly where the ground may be of a hard nature, that the mere weight of the hoe 7 is not sufficient to penetrate and cultivate the same. Therefore it is desired to regulate tension on the hoe, this being accomplished by adjustment of the hand lever 17 which forces the rod 11 through the strap 10, increasing the tension upon the spring 15. The resilient mounting thus described also serves to compensate for unevenness in the ground between the cultivator hoe and the supporting wheels. When it is desired to raise the cultivator hoe for transportation, or other reasons, the hand lever 17 is swung downwardly on the detent 18, causing the rod 11 to lift the yoke 6 and raise the hoe 7 to clear the ground or crops.

While a specific form of the attachment has been illustrated and described, it will be appreciated that various modifications may be employed, inasmuch as the salient feature of the invention resides in the adjustable and resilient connection between the hoe and cultivator frame to provide for the desired penetration of the rotary hoe as well as to compensate for unevenness in the ground and raising the hoe when its use is not desired.

I claim:—

In combination with a row crop cultivator provided with a frame and spaced sets of cultivator teeth disposed on opposite sides of the longitudinal center of the frame, of spaced depending arms secured to the frame and terminating below the same, a single piece U-shaped yoke frame including spaced parallel arms and a front connecting piece, the yoke frame being of substantially the same width as a set of cultivator teeth and disposed between the sets of cultivator teeth and arranged at the longitudinal center of the frame, bearings carried by the rear ends of the parallel arms, a rotary hoe including a shaft mounted in said bearings and a plurality of rotary teeth on the shaft confined between said bearings, the forward end of the yoke frame being pivotally connected to and disposed between the lower ends of the depending arms in contact therewith, whereby lateral shifting of the yoke frame is prevented, a strap connected to the parallel arms intermediate their ends, and an expansion spring engaging the central portion of the strap, whereby the pivots and the spring forms a three-point suspension for the yoke frame, the engagement of the spring with the central portion of the strap insuring the even distribution of pressure on said yoke frame.

In testimony that I claim the foregoing I have hereunto set my hand at Cross Plains, in the county of Dane, and State of Wisconsin.

OSWIN BRAUN.